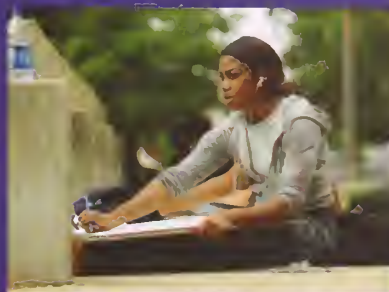




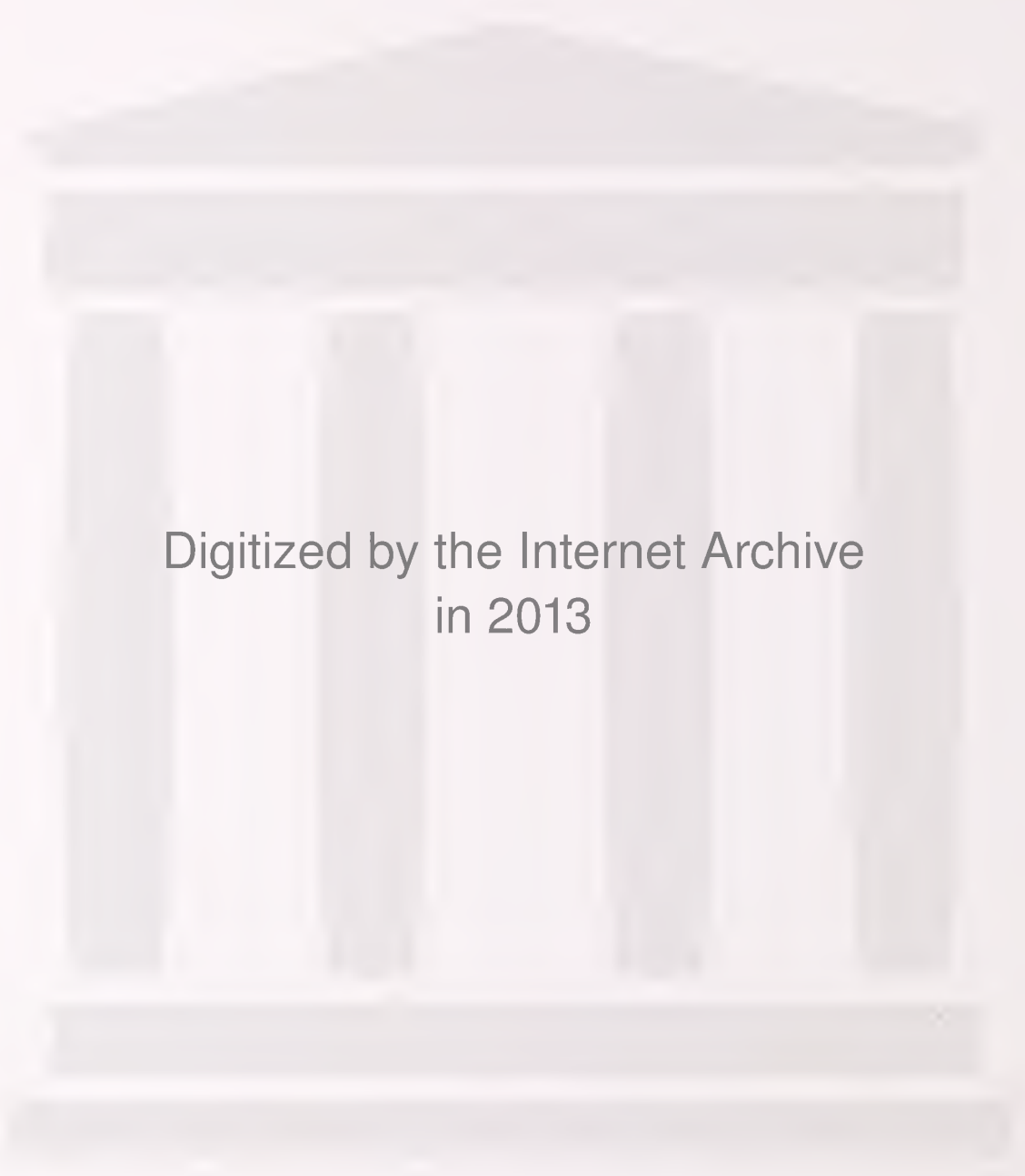
Undergraduate Announcements 2010-2011



A Clemson Tiger
is ready to learn.



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UNDERGRADUATE ANNOUNCEMENTS

2010-2011



2009-2010 Record
One Hundred Seventeenth Year
Volume 85

NOTIFICATION OF RIGHTS UNDER THE FAMILY EDUCATIONAL RIGHTS AND PRIVACY ACT (FERPA)

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The Family Educational Rights and Privacy Act (FERPA) affords students certain rights with respect to their education records. These rights include:

1. The right to inspect and review the student's education records within 45 days of the day the University receives a request for access.

A student should submit to the registrar, dean, head of the academic department, or other appropriate official, a written request that identifies the record(s) the student wishes to inspect. The University official will make arrangements for access and notify the student of the time and place where the records may be inspected. If the records are not maintained by the University official to whom the request was submitted, that official shall advise the student of the correct official to whom the request should be addressed.

- (2) The right to request the amendment of the student's education records that the student believes are inaccurate, misleading, or otherwise in violation of the student's privacy rights under FERPA.

A student who wishes to ask the University to amend a record should write the University official responsible for the record, clearly identify the part of the record the student wants changed, and specify why it should be changed.

If the University decides not to amend the record as requested, the University will notify the student in writing of the decision and the student's right to a hearing regarding the request for amendment. Additional information regarding the hearing procedures will be provided to the student when notified of the right to a hearing.

Note: The challenge of a student under this paragraph is limited to information which relates directly to the student and which the student asserts is inaccurate or misleading. With regard to a student's grade, this right does not permit the student to contest a grade on the grounds that a higher grade is deserved, but only to show that the grade has been inaccurately recorded.

- (3) The right to provide written consent before the University discloses personally identifiable information from the student's education records, except to the extent that FERPA authorizes disclosure without consent.

The University discloses education records without a student's prior written consent under the FERPA exception for disclosure to school officials with legitimate educational interests. A school official is a person employed by the University in an administrative, supervisory, academic or research, or support staff position (including law enforcement unit personnel and health staff); contractors, consultants, volunteers and other outside parties to whom the institution has outsourced institutional services or functions instead of using University employees or officials (such as an attorney, auditor, or collection agent); a person serving on the Board of Trustees; or a student serving on an official committee, such as a disciplinary or grievance committee, or assisting another school official in performing his or her tasks.

A school official has a legitimate educational interest if the official needs to review an education record in order to fulfill his or her professional responsibilities for the University.

Upon request, the University also discloses education records without consent to officials of another school in which a student seeks or intends to enroll.

- (4) The right to refuse to permit the designation of any or all of the following categories of personally-identifiable information as directory information, which is not subject to the above restrictions on disclosure: student's full name, permanent address and telephone number, local address and telephone number, e-mail address, state of residence, date and place of birth, marital status, academic class, class schedule and class roster, name of advisor, major field of study, including the college, division, department or program in which the student is enrolled, participation in officially recognized activities and sports, weight and height of members of athletic teams, dates of attendance and graduation, degrees and honors and awards received including selection to a dean's list or honorary organization and the grade point average of students selected, and the most previous educational institution attended. Photographic, video, or electronic images of students taken and maintained by the University are also considered directory information.

Directory information may be disclosed by the University for any purpose, at its discretion. Any student wishing to exercise his/her right to refuse to permit the designation of any or all of the above categories as directory information must give written notification to the Registration Services Office (E-206 Martin Hall) by the last day to register for the enrollment period concerned as published in the Clemson University calendar.

- (5) The right to file a complaint with the U.S. Department of Education concerning alleged failures by the University to comply with the requirements of FERPA. The name and address of the Office that administers FERPA is Family Policy Compliance Office, U.S. Department of Education, 400 Maryland Avenue, SW, Washington, DC 20202-5901.

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ACADEMIC CALENDAR

Maymester 2010

May 10, M	Late enrollment; first day of class
May 11, Tu	Last day to register
May 12, W	Last day to drop a class or withdraw from the University without a W grade
May 15, Sa	Classes meet
May 17, M	Last day for instructors to issue mid-term evaluations
May 18, Tu	Last day to drop a class or withdraw from the University without final grades
May 22, Sa	Classes meet
May 25, Tu	Examinations
May 28, F	9:00 A.M.—Deadline to submit all grades

First Summer Session 2010

May 17, M	Late enrollment
May 18, Tu	Classes begin
May 19, W	Last day to register or add a class
May 21, F	Last day to drop a class or withdraw from the University without a W grade
June 1, Tu	Last day for instructors to issue mid-term evaluations
June 3, Th	Last day to drop a class or withdraw from the University without final grades
June 7, M	Last day to order diploma for August graduation
June 22, Tu	Examinations
June 24, Th	9:00 A.M.—Deadline to submit all grades

Second Summer Session 2010

June 28, M	Orientation
June 29, Tu	Late enrollment
June 30, W	Classes begin
July 1, Th	Last day to register or add a class
July 5, M	Holiday
July 6, Tu	Last day to drop a class or withdraw from the University without a W grade
July 10, Sa	Classes meet
July 14, W	Last day for instructors to issue mid-term evaluations
July 16, F	Last day to drop a class or withdraw from the University without final grades
August 4, W	Examinations
August 5, Th	2:00 P.M.—Deadline to submit candidate grades
August 6, F	9:00 A.M.—Deadline to submit other grades
August 6, F	Candidates for graduation may access grades
August 7, Sa	Graduation

Fall Semester 2010

August 16–17, M–Tu	Late enrollment
August 17, Tu	University Convocation
August 18, W	Classes begin; late enrollment fee applies
August 24, Tu	Last day to register or add a class
August 31, Tu	Last day to drop a class or withdraw from the University without a W grade
September 7, Tu	Last day to order diploma for December graduation
October 8, F	Last day for instructors to issue mid-term evaluations
October 22, F	Last day to drop a class or withdraw from the University without final grades
November 1–2, M–Tu	Fall break
November 3, W	Registration for spring, Maymester, and summer terms begins
November 24–26, W–F	Thanksgiving holidays
December 2–3, Th–F	Classes meet; exams permitted in labs only
December 6–10, M–F	Examinations
December 13, M	9:00 A.M.—Deadline to submit candidate grades
December 15, W	9:00 A.M.—Deadline to submit other grades
December 15, W	Candidates for graduation may access grades
December 16, Th	Graduation

Spring Semester 2011

January 9–10, Su–M	Orientation
January 10–11, M–Tu	Late enrollment
January 12, W	Classes begin
January 17, M	Martin Luther King Jr. holiday
January 19, W	Last day to register or add a class
January 26, W	Last day to drop a class or withdraw from the University without a W grade
February 2, W	Last day to order diploma for May commencement
March 4, F	Last day for instructors to issue mid-term evaluations
March 18, F	Last day to drop a class or withdraw from the University without final grades
March 21–25, M–F	Spring break
April 2–9, Sa–Sa	Honors and Awards Week
April 4, M	Registration for fall semester begins
April 28–29, Th–F	Classes meet; exams permitted in labs only
May 2–6, M–F	Examinations
May 10, Tu	9:00 A.M.—Deadline to submit candidate grades
May 11, W	9:00 A.M.—Deadline to submit other grades
May 12, Th	Candidates for graduation may access grades
May 13, F	Commencement
	9:30 A.M. (Colleges AFLS, AAH, and ES)
	2:30 P.M. (Colleges BBS and HEHD)

Maymester 2011

May 16, M	Late enrollment; first day of class
May 17, Tu	Last day to register
May 18, W	Last day to drop a class or withdraw from the University without a W grade
May 21, Sa	Classes meet
May 23, M	Last day for instructors to issue mid-term evaluations
May 25, W	Last day to drop a class or withdraw from the University without final grades
May 28, Sa	Classes meet
May 31, Tu	Examinations
June 3, F	9:00 A.M.—Deadline to submit all grades

First Summer Session 2011

May 23, M	Late enrollment
May 24, Tu	Classes begin
May 25, W	Last day to register or add a class
May 27, F	Last day to drop a class or withdraw from the University without a W grade
June 10, F	Last day for instructors to issue mid-term evaluations
June 13, M	Last day to order diploma for August graduation
June 15, W	Last day to drop a class or withdraw from the University without final grades
June 28, Tu	Examinations
June 30, Th	9:00 A.M.—Deadline to submit all grades

Second Summer Session 2011

July 4, M	Holiday
July 5, Tu	Orientation
July 6, W	Late enrollment
July 7, Th	Classes begin
July 8, F	Last day to register or add a class
July 9, Sa	Classes meet
July 11, M	Last day to drop a class or withdraw from the University without a W grade
July 25, M	Last day for instructors to issue mid-term evaluations
July 28, Th	Last day to drop a class or withdraw from the University without final grades
August 10, W	Examinations
August 11, Th	2:00 P.M.—Deadline to submit candidate grades
August 12, F	9:00 A.M.—Deadline to submit other grades
August 12, F	Candidates for graduation may access grades
August 13, Sa	Graduation

Fall Semester 2011

August 22–23, M–Tu	Late enrollment
August 23, Tu	University Convocation
August 24, W	Classes begin
August 30, Tu	Last day to register or add a class
September 6, Tu	Last day to drop a class or withdraw from the University without a W grade
September 13, Tu	Last day to order diploma for December graduation
October 14, F	Last day for instructors to issue mid-term evaluations
October 17–18, M–Tu	Fall break
October 31, M	Registration for spring, Maymester, and summer terms begins
November 1, Tu	Last day to drop a class or withdraw from the University without final grades
November 23–25, W–F	Thanksgiving holidays
December 8–9, Th–F	Classes meet; exams permitted in labs only
December 12–16, M–F	Examinations
December 19, M	9:00 A.M.—Deadline to submit candidate grades
December 21, W	9:00 A.M.—Deadline to submit other grades
December 21, W	Candidates for graduation may access grades
December 22, Th	Graduation

Spring Semester 2012

January 8–9, Su–M	Orientation
January 9–10, M–Tu	Late enrollment
January 11, W	Classes begin
January 16, M	Martin Luther King Jr. holiday
January 18, W	Last day to register or add a class
January 25, W	Last day to drop a class or withdraw from the University without a W grade
February 1, W	Last day to order diploma for May commencement
March 2, F	Last day for instructors to issue mid-term evaluations
March 16, F	Last day to drop a class or withdraw from the University without final grades
March 19–23, M–F	Spring break
April 2, M	Registration for fall semester begins
April 7–14, Sa–Sa	Honors and Awards Week
April 26–27, Th–F	Classes meet; exams permitted in labs only
April 30–May 4, M–F	Examinations
May 8, Tu	9:00 A.M.—Deadline to submit candidate grades
May 9, W	9:00 A.M.—Deadline to submit other grades
May 10, Th	Candidates for graduation may access grades
May 11, F	Commencement 9:30 A.M. (Colleges AFLS, AAH, and ES) 2:30 P.M. (Colleges BBS and HEHD)

Note: Dates on this calendar were accurate at the time of printing. Dates, however, may change as conditions warrant. Current information is available at www.registrar.clemson.edu/html/Acad_Cal.htm.

ADMINISTRATION

UNIVERSITY GOVERNANCE AND ADMINISTRATION

The University is governed by a board of 13 members, six selected by the state Legislature and seven self-perpetuating life members, in accord with the will of Thomas Green Clemson. The Board of Trustees is primarily responsible for adopting the long-range objectives of the University and the basic policies for achieving them; providing policy instruction for long-range planning; adopting the statutes of the University; electing the president of the University; employing the secretary of the board; maintaining ownership of University assets; and overseeing the evaluation of the University.

The president is the chief executive officer of the University, providing leadership to all phases of University planning, coordinating the operations of all units of the University, carrying out major University public relations functions, evaluating the results of University plans, and appointing personnel who report to the president. The day-to-day operations of the University are administered by the president and executive officers for advancement, public service and agriculture, student affairs, and research and economic development.

The provost and vice president for academic affairs is the chief academic officer of the University. The provost is responsible directly to the president for all academic matters and has administrative jurisdiction over teaching and computing services. Vice provosts assist in administering and performing duties in coordinating graduate and undergraduate curricula; supervising computer information services, the libraries, scholarship and award programs; and other duties assigned by the provost.

Academic deans are the chief administrative officers of their individual colleges and report directly to the provost. They provide leadership in formulating and carrying out educational policy; review and make recommendations on personnel matters; and carry out and administer the academic and financial affairs of their colleges.

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GENERAL INFORMATION

PURPOSE OF CATALOG

The purpose of this catalog is to give a general description of Clemson University and to provide prospective students with detailed information regarding the various colleges and departments within the University and curricula offered by the University. Inasmuch as the educational process necessitates change, the information and educational requirements in this catalog represent a flexible program that may be altered where such alterations are thought to be in the mutual interest of the University and its students.

The provisions of this catalog do not constitute a contract that may be accepted by students through registration and enrollment in the University. The University reserves the right to change without notice any fee, provision, offering, or requirement in this catalog and to determine whether a student has satisfactorily met its requirements for admission or graduation. The University further reserves the right to require a student to withdraw from the University for cause at any time.

Each curriculum shall be governed by the requirements in effect on the date of enrollment. If a student withdraws from the University and subsequently returns or does not remain continuously enrolled (summers excluded), the requirements in effect at the time of return will normally prevail.

STUDENT RESPONSIBILITY

All colleges and departments establish certain academic requirements that must be met before a degree is granted. Advisors, department chairs, and deans are available to help the student understand and meet these requirements; but the student is responsible for fulfilling them. If, at the end of a student's course of study, the requirements for graduation have not been satisfied, the degree will not be granted. For this reason, it is important for students to acquaint themselves with all academic requirements throughout their college careers and to be responsible for completing all requirements within prescribed deadlines and time limits.

HISTORY

When one man of wisdom and foresight can look beyond the despair of troubled times and imagine what could be, great things can happen. That is what the University's founder, Thomas Green Clemson, was able to do in the post-Civil War days. He looked upon a South that lay in economic ruin, once remarking that "conditions are wretched in the extreme" and that "people are quitting the land." Still, among the ashes he saw hope. Joined by his wife, Anna Calhoun Clemson, Mr. Clemson envisioned what could be possible if the South's youth were given an opportunity to receive instruction in scientific agriculture and the mechanical arts. He once wrote, "The only hope we have for the advancement of agriculture (in the U.S.) is through the sciences, and yet there is not one single institution on this continent where a proper scientific education can be obtained." When he was president of the Pendleton Farmers Society in 1866,

Mr. Clemson served on a committee whose purpose was to promote the idea of founding an institution for "educating the people in the sciences" and "which will in time secure permanent prosperity."

When he died on April 6, 1888, a series of events began that marked the start of a new era in higher education in the state of South Carolina, especially in the study of science, agriculture, and engineering. Mr. Clemson's passing set the stage for the founding of the university that bears his name—the beginning of a true "people's university," which opened the doors of higher education to all South Carolinians, rich and poor alike. In his will, which was signed November 6, 1886, Mr. Clemson bequeathed the Fort Hill plantation and a considerable sum from his personal assets for the establishment of an educational institution of the kind he envisioned. He left a cash endowment of approximately \$80,000, as well as the 814-acre Fort Hill estate, to South Carolina for such a college. The biggest obstacle in the creation of an agricultural college—the initial expense—was removed by Mr. Clemson's bequest.

On November 27, 1889, Governor Richardson signed the bill accepting Thomas Clemson's gift. Soon after, a measure was introduced to establish the Clemson Agricultural College, with its trustees becoming custodians of Morrill Act and Hatch Act funds made available for agricultural education and research by federal legislative acts. The founding of Clemson Agricultural College supplanted the South Carolina College of Agriculture and Mechanics, which had been designated in Columbia in 1880.

Thomas Green Clemson came to the foothills of South Carolina when he married Anna Maria Calhoun, daughter of South Carolina's famous statesman John C. Calhoun.

Born in Philadelphia, Mr. Clemson was educated at schools both in the United States and France, where he attended lectures at the Royal School of Mines, studied with prominent scientists in the private laboratories of the Sorbonne Royal College of France, and received his diploma as an assayer from the Royal Mint in Paris. Mr. Clemson, then in his mid-20s, returned to America greatly influenced by his European studies. He became a great advocate of the natural sciences, achieving a considerable reputation as a mining engineer and a theorist in agricultural chemistry. He also was a gifted writer whose articles were published in the leading scientific journals of his day, an artist and a diplomat who represented the U.S. government as *chargé d'affaires* to Belgium for almost seven years.

Mr. Clemson had a lifelong interest in farming and agricultural affairs. He served as the nation's first superintendent of agricultural affairs (predecessor to the present secretary of agriculture position) and actively promoted the establishment and endowment of the Maryland Agricultural College in the 1850s. Though remembered today for these accomplishments, Thomas Clemson made his greatest historical contribution when, as a champion of formal scientific education, his life became intertwined with the destiny of educational and economic development in South Carolina. Although he never lived to see it, his dedicated efforts culminated in the founding of Clemson Agricultural College.

At the time of his death, Mr. Clemson was living at the Fort Hill homeplace, which today is a national historic landmark and provides a historic centerpiece for the Clemson University campus. He had inherited the house and plantation lands of his famous father-in-law, Senator Calhoun, upon the death of Mrs. Clemson in 1875.

Clemson College formally opened in July 1893, with an enrollment of 446. From the beginning, the college was an all-male military school. It remained this way until 1955, when the change was made to "civilian" status for students and Clemson became a coeducational institution. In 1964, the college was renamed Clemson University as the state legislature formally recognized the school's expanded academic offerings, Ph.D. granting status and research pursuits.

On November 27, 1989, the University observed the 100th anniversary of the state's acceptance of the terms and conditions of Mr. Clemson's bequest.

The enrollment of Clemson has grown from 446 students at the opening of the University to 19,111 for the first semester 2009-2010. Since the opening of the University, 108,812 students have been awarded bachelor's degrees. During this same period, 426 associate degrees, 29,850 master's, 364 education specialist, and 3,338 doctor's degrees have been awarded, a total of 142,790 degrees.

Today, more than a century later, the University is much more than its founder ever could have imagined. With its diverse learning and research facilities, the University provides an educational opportunity not only for the people of the state, as Mr. Clemson dreamed, but for thousands of young men and women throughout the country and the world.

THE CAMPUS

The 1,400-acre Clemson University campus is sited on the former homestead of statesman John C. Calhoun. Nestled in the foothills of the Blue Ridge Mountains and adjacent to Lake Hartwell, the campus commands an excellent view of the mountains to the north and west, some of which attain an altitude of over 5,000 feet above mean sea level.

The Norfolk and Southern Railway and U.S. highways 76 and 123 provide easy access to the city of Clemson and to the University. Oconee County Airport is four miles from the library. Both Atlanta and Charlotte are two hours driving time away.

Campus architecture is a pleasing blend of traditional and modern facilities enhanced by a beautiful landscape of towering trees, grassy expanses, and flowering plants. Academic, administrative, and student service buildings on campus represent an insured value of \$627 million. Clemson University's real estate holdings include more than 32,000 acres of forestry and agricultural lands throughout the state, the majority of which are dedicated to Clemson's research and public-service missions.

Fort Hill, the former home of John C. Calhoun inherited by Thomas Clemson, and the Hanover House are both listed on the National Register of Historic Places and are open to the public. The campus also has two recognized historic districts.

The Strom Thurmond Institute houses the institute offices, Senator Thurmond's papers and memorabilia, and the special collections of the Cooper Library, including papers of John C. Calhoun and James Byrnes, two of the most important South Carolinians since 1787. The institute is a part of an instructional and public-service district that includes the Brooks Center for the Performing Arts and the Madren Center for Continuing Education.

Clemson offers limited graduate and undergraduate coursework in Greenville, SC. Also located in Greenville is the Clemson University International Center for Automotive Research (CU-ICAR), a 250-acre advanced-technology research campus where university, industry and government organizations collaborate.

VISION STATEMENT

Clemson University will be one of the nation's top-20 public universities.

MISSION STATEMENT

The mission of Clemson University is to fulfill the covenant between its founder and the people of South Carolina to establish a "high seminary of learning" through its historical land-grant responsibilities of teaching, research, and extended public service.

Clemson University is a selective, public, land-grant university in a college-town setting along a dynamic Southeastern corridor. The University is committed to world-class teaching, research, and public service in the context of general education, student development, and continuing education. Clemson's desire is to attract a capable, dedicated, and diverse student body of approximately 12,000 to 14,000 undergraduate and 4,000 to 5,000 graduate students, with priority to students from South Carolina.

Clemson offers a wide array of high-quality baccalaureate programs built around a distinctive core curriculum. Graduate and continuing education offerings respond to the professions, while doctoral and research programs contribute to the economic future of the state, nation, and world. The University emphasizes agriculture, architecture, business, education, engineering, natural resources, science, and technology. The University also promotes excellence in education and scholarship in selected areas of the creative arts, health, human development, the humanities, and social sciences. In all areas, the goal is to develop students' communication and critical-thinking skills, ethical judgment, global awareness, and scientific and technological knowledge. Students remain the primary focus of the University.

Just as Clemson values its students, the University also values its faculty and staff who have committed their talents and careers to advance its mission. Clemson pledges to support their work, to encourage their professional development, to evaluate their professional performance, and to compensate them at nationally competitive levels.

ACCREDITATION

Clemson University is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools to award the bachelor's, master's, education specialist, and doctoral degrees. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, GA 30033-4097 or call (404) 679-4500 for questions about the accreditation of Clemson University.

Curricula are accredited by AACSB International (Association to Advance Collegiate Schools of Business), Accreditation Board for Engineering and Technology, American Council for Construction Education, American Dietetic Association (CADE), American Society of Landscape Architects, Commission on Collegiate Nursing Education (CCNE), Council for Accreditation of Counseling and Related Education Programs (CACREP), National Architectural Accrediting Board, National Association of Schools of Art and Design, National Council for Accreditation of Teacher Education, NRPA/AALR Council on Accreditation, Planning Accreditation Board, and Society of American Foresters. Documentation of accreditation is available in the college deans' offices.

ADVISING POLICY

Academic advising is an on-going educational process that connects the student to the University. Academic advising supports the University's mission of preparing the student for learning beyond the confines of the academy. Academic advisors represent and interpret University policies and procedures to the student and help the student navigate the academic and organizational paths of the institution.

To ensure that students receive both personal and professional assistance in navigating through curricula and University requirements toward degree completion and graduation, each student is assigned to an academic advisor (either professional or faculty advisor). Advisors are available to assist students with issues related to degree planning, course selection, withdrawals, degree requirements, academic policies, academic difficulty, campus resources, internships/practicum opportunities, and career/graduate school planning. Students are responsible for adhering to academic policies, preparing for advising meetings and taking ownership for their educational experience. Students receive their academic advising materials and number from their advisors during their pre-registration advising meetings. Students uncertain of their assigned advisor are encouraged to seek assistance from the departmental office/advising center for their major.

For more information, visit <http://www.clemson.edu/academics/advising/>.

LIBRARIES

The Libraries' Web site at www.clemson.edu/library provides access to a multitude of information resources, including the library catalog, hundreds of databases, more than 40,000 electronic journals, and information regarding library services.

The Libraries' services include circulation, reference, interlibrary loan, class instruction, and tours. Cooper Library houses a computer lab (maintained by CCIT), Java City Cyber Café, Snax & Stax convenience store, and a popular reading and audiobooks collection. Equipment available includes photocopiers, scanners, fax machines, and wireless laptops in Cooper Library and a color laser printer, engineering plotter, and large-format photocopier in the Gunning Architecture Library.

The Clemson University Libraries consist of a main library and two branches. R.M. Cooper Library, Clemson's main library, is a six-floor building located at the center of campus. Most of the books and journals are located there, as well as government publications, microforms, and media. The Gunning Architecture Library in Lee Hall contains collections that focus on architecture, city and regional planning, construction science, landscape architecture, and visual arts. Special Collections, on the lower level of the Strom Thurmond Institute, houses the rare book collection, University Archives, and many manuscript collections, including the papers of John C. Calhoun and Thomas Green Clemson.

Total holdings for the library system include more than 1.8 million items, including books, periodicals, electronic resources, government publications and patents, musical recordings, DVDs and videos, audiobooks, maps, and microforms.

COMPUTING RESOURCES

Clemson Computing and Information Technology (CCIT) supports the computing needs of students and employees with comprehensive services, including laptop support, training, printing and plotting, computer repair, software licenses, wireless access points, network and information security, course management system, and more.

Public access computer labs are available throughout campus and contain high-end PCs running Windows and black and white laser printing equipment. Students are allocated a specified number of pages and plots per semester in the public access computer labs. Any printing and plotting beyond the quota is charged to the student. Students have the same access on lab computers as they do on their personal laptops using the Clemson software image. Software and access available in the labs include Internet, e-mail, Google Apps for Education, the Microsoft Office Suite, which includes Word, Excel, Access, Outlook, and PowerPoint applications, and more.

Getting Help

The Customer Support Center, located on the lower level of the University Union, serves as a central point of contact for general computing assistance, laptop support and repair, and consulting services. Students may call (864) 656-3494, e-mail ITHELP@clemson.edu, or walk in during hours of operation (check the CCIT Web site at <http://www.clemson.edu/ccit>). A satellite CCIT Help Desk is located in Cooper Library on Level 5.

E-mail and Accessing Your Account

Each student's e-mail address is userid@clemson.edu. CCIT automatically establishes a Google Apps for Education account at <http://g.clemson.edu> for all

incoming students. Google Apps offers full e-mail functionality and large data storage, plus Google Calendar, Google Docs and Google Sites. Google Mail is the preferred e-mail system for students and allows them to use Google's e-mail with their Clemson e-mail address while at Clemson and even after graduation. Student e-mail accounts (*userid@clemson.edu*) are automatically forwarded to their Google Mail account (*userid@g.clemson.edu*). E-mail forwarding preferences may be verified and changed at http://www.clemson.edu/email_forwarding.

Computer Training

CCIT provides computer training and support to faculty, staff and students in the use of the MyCLE portal and the Web-based course management system (Blackboard), the Clemson computer network, and many desktop applications. Training is offered as part of regular University courses, short courses, special training programs, and e-learning courses. Distance-learning processes and technologies are also supported. Visit the CCIT Web site for a complete list of available courses.

Wired and Wireless Access

The campus computer network can be accessed through wired network connections found in all on-campus residences or through the University's extensive wireless network, which provides coverage to most areas of Clemson's campus. TigerNet is Clemson's primary wireless network and allows students to connect securely using their Clemson user name and password. More information and complete coverage details, including a list of compatible wireless cards, can be found on the CCIT Web site.

Security

Clemson University requires all users to run virus protection and install the latest operating system patches on their computers. Clemson has a site license for the McAfee products, VirusScan (Windows), and McAfee Security Suite (MacOS). This and other security software options are available on the CCIT Web site.

Laptop Program

All undergraduate and MBA graduate students are required to have a laptop. While students may bring any laptop that meets the minimum specifications, recommended laptops are posted on the CCIT Web site. Clemson University works with vendors to offer recommended laptops at special discounted prices. Students using the recommended laptops will receive both software and hardware support. Repair technicians on campus can complete warranty repairs on these laptops. Many other brands of computers can also be serviced and repaired for a fee or under manufacturer's warranty if applicable. Students who have recommended laptops that must be in Hardware Repair for an extended period of time may be eligible to check out a loaner laptop if available.

Additional Information

Additional information—including information about Google Apps for Education (GAE); computing and research, software licensing; IT e-mail alerts; ClemsonGuest wireless access service; the Acceptable Use Policy for Students; and the Clemson Apple Store—is available at <http://www.clemson.edu/ccit> or by e-mailing ITHelp@clemson.edu.

CALHOUN HONORS COLLEGE

Established in 1962, the Calhoun Honors College strives to enrich the educational experience of highly motivated, academically talented students by providing opportunities for scholarship and research not always available to undergraduates. Honors students become part of a dynamic academic community dedicated to the study of ideas and the life of the mind.

Calhoun Honors students are offered the opportunity to take a wide variety of specialized honors courses. These include a series of intensive Freshman Colloquia; Calhoun Honors Seminars emphasizing multidisciplinary approaches and contemporary issues; and numerous courses satisfying general education, major or minor requirements. Honors students are also encouraged to pursue research-based programs leading to departmental honors.

Freshman admission to Calhoun Honors College requires the submission of an application separate from and in addition to the application for undergraduate admission to Clemson University. In addition to the student's application, the Honors College requires a copy of the student's high school transcript and two letters of recommendation, one from a high school guidance counselor and one from a teacher. Admission is highly selective and is based, in part, on the quality of the applicant pool and the availability of space for freshmen in the Honors College.

Currently-enrolled Clemson students may apply for membership if they are full-time, degree-seeking undergraduates and have earned a cumulative grade-point ratio of 3.50 or higher. Students must have at least four semesters remaining to complete their degree requirements.

Additional special opportunities for honors students include summer study programs in Brussels, Belgium, and India; EUREKA!, a summer research program for entering freshmen; and other study abroad opportunities. Each of these programs is competitive and requires a separate application.

The Calhoun Honors College is institutionally responsible for nationally competitive fellowships and awards, including Rhodes, Marshall, Truman, Goldwater and Fulbright.

In addition to the intellectual challenge of Honors, advantages of membership include priority course scheduling, honors housing (on a space-available basis), extended library loan privileges, a series of discussion programs, and special lectures and cultural events.

Visit www.clemson.edu/calhonors for more information.

COOPERATIVE EDUCATION PROGRAM

The Cooperative Education Program (Co-op) is an academic engaged-learning program that provides students with an opportunity to alternate semesters of academic study with semesters of paid, discipline-specific work experience with participating employers. A basic goal of the program is to help bridge the gap between academic study and its application in professional practice. Co-op assignments add a contextual dimension to the curriculum and challenge students to think critically and creatively

as they engage in problem-solving within a work setting. Cooperative Education, as the term implies, represents a partnership between the University, the student, and participating industry, business and government agencies. To ensure that students have experiences that are educationally meaningful, members of the co-op faculty and staff monitor each student's co-op assignment throughout his/her participation in the program.

Students may qualify for the program after satisfactorily completing 30 credit hours of academic coursework. Transfer students may qualify in one semester. Students normally enter the program as sophomores or juniors and complete two to five rotations in a co-op assignment. Completion of the co-op program is a curricular requirement for some majors such as Packaging Science. Packaging Science students normally complete two back-to-back co-op rotations during a six-month period.

Students enrolled in the program register for the appropriate co-op course number (e.g. CO-OP 101, 102, etc.) for each rotation and receive a grade of Pass or Fail, although no credit hours are awarded. Students pay a program participation fee each semester or summer session that coincides with a co-op rotation. In responding to questions about student status related to health insurance, taxes, loans, etc., the University classifies a student on a co-op rotation as a full-time continuing student.

Visit www.clemson.edu/coop for more information.

STUDY AND WORK ABROAD PROGRAMS

Through the Office of International Affairs, students may choose from a variety of study abroad programs. Program length can range from short-term, such as during spring break, to a summer session, to a full semester or year abroad. Programs vary to fulfill the academic and discipline-specific needs of students. There are programs for every academic major at Clemson. Exchange programs are available with top institutions around the world, such as ICHEC Management School in Brussels, Belgium; the University of Aberdeen in Scotland; University of Newcastle in Australia; University of Stellenbosch in South Africa; and Universidad de Alicante in Spain. Programs are available in virtually every country in the world: Argentina, Chile, China, Czech Republic, Ecuador, England, France, Germany, Japan, Mexico, Russia, Scotland, and many more. Both Clemson-sponsored programs and exchange programs allow students to enroll and pay fees directly to Clemson while they study abroad. Transfer credit normally applies within the major with prior academic department approval. Financial aid and scholarships also transfer for many of the programs abroad.

Internships and work abroad programs are also available. Students should plan early for their study abroad experience. First priority application deadlines are usually in September/October for spring programs, in February/March for fall, academic year, and summer programs. Interested students should contact the Office of International Affairs, E-307 Martin Hall, at the beginning of each semester and throughout the academic year to explore opportunities abroad.

Additional information is available at www.clemson.edu/studyabroad or by e-mailing abroad1@clemson.edu.

RESERVE OFFICERS TRAINING CORPS

Air Force and Army

The departments of the Air Force and the Army maintain ROTC units at Clemson University. Their mission is to produce officers of high quality for technical and nontechnical careers in the U.S. Air Force and Army. Two-, three-, and four-year programs are available. The four-year program consists of the basic course for freshmen and sophomores and the advanced course for juniors and seniors.

Scholarships, available to selected ROTC students, pay for tuition, books, and laboratory expenses, in addition to a variable stipend ranging from \$300-\$500 per month during the school year. Nonscholarship advanced Cadets also receive a stipend. Basic course credit may be awarded to students having prior military service. Selected advanced Air Force Cadets receive flight training at government expense. Reserve or National Guard duty can be guaranteed by the U.S. Army.

Cadets who complete the Advanced or Professional Course and satisfy commissioning requirements are appointed Second Lieutenants. Ample opportunity exists for graduate study in both services, with temporary deferments possible.

HONOR ORGANIZATIONS

Clemson University has a number of academic honorary societies that recognize outstanding scholarship by students, faculty, and staff:

- Alpha Epsilon Delta (Premedical)
- Alpha Epsilon Lambda (Graduate Students)
- Alpha Kappa Delta (Sociology)
- Alpha Lambda Delta (Freshmen)
- Alpha Pi Mu (Industrial Engineering)
- Alpha Zeta (Agriculture)
- Beta Alpha Psi (Accounting and Financial Management)
- Beta Gamma Sigma (Business)
- Blue Key (Juniors and Seniors)
- Calhoun Honors Society (Honors College)
- Chi Epsilon (Civil Engineering)
- Eta Kappa Nu (Electrical and Computer Engineering)
- Eta Sigma Gamma (Health Education)
- Gamma Epsilon Tau (Graphic Communications)
- Golden Key National Honor Society (Juniors and Seniors)
- Kappa Delta Pi (Education)
- Keramos (Ceramic and Materials Engineering)
- Mortar Board (Seniors)
- Mu Beta Psi (Music)
- Mu Kappa Tau (Marketing)
- Omicron Delta Epsilon (Economics)
- Omicron Delta Kappa (Leadership)
- Order of Omega (Seniors)
- Phi Beta Kappa
- Phi Kappa Phi
- Phi Psi (Textiles)
- Phi Sigma Pi (Honorary)
- Pi Delta Phi (French)
- Pi Sigma Alpha (Political Science)
- Pi Tau Sigma (Mechanical Engineering)
- Psi Chi (Psychology)
- Sigma Tau Delta (English)
- Tau Beta Pi (Engineering)
- Tau Sigma Delta
- Upsilon Pi Epsilon (Computer Science)
- Xi Sigma Pi (Forestry)

CLEMSON UNIVERSITY EXPERIMENT STATION

The Clemson University Experiment Station is part of a nationwide system of scientists working to improve the quality of life for people in their home states, the nation, and the world.

Both undergraduate and graduate students work with researchers to develop science-based information needed to address issues such as agricultural productivity and profitability, economic and community development, environmental conservation, food safety and nutrition and youth development. Clemson scientists have been involved in agricultural and forestry research since the University was founded in 1889. Today research is conducted in state-of-the-art laboratories, on farms and forests on Clemson's campus and at five research and education centers strategically located in the state's distinct soil and climate regions.

Clemson researchers collaborate with colleagues on studies that span the globe. These include the genetic structure and functions for plants and animals, the impact of urban sprawl on the environment, techniques to reduce bullying in schools, the active ingredients in medicinal plants, and the use of nanotechnology in food packaging to detect contamination. Their work has produced more than 100 new varieties of food and fiber crops and more than 40 patents. Each year work is conducted on more than 150 projects funded through federal, state and private sources, including the U.S. Department of Agriculture, the U.S. Forest Service, the National Science Foundation, the South Carolina General Assembly, and corporate partners.

CLEMSON UNIVERSITY FOUNDATION

The Clemson University Foundation is a nonprofit organization that solicits, manages, and administers gifts from private sources for academic programs at Clemson University.

Chartered in 1933, the foundation is a primary component of the Advancement Program at the University. There are 36 elected members of the Board of Directors. Currently, 33 of the 36 are Clemson alumni. The board also includes six automatic directors; 15 ex officio directors, including a graduate and an undergraduate student representative; and 12 honorary directors.

The foundation operates through committees that report via an executive committee to the full board. These include the Audit, Finance, Development, Investment, Nominations, and Policy and Constitution Committees. Fund raising is in concert with the university and through the Development Committee and, if applicable, a Campaign Executive Committee. This includes solicitation of annual, major, planned, corporate and foundation gifts in support of University priorities and coordination of college-based fund-raising initiatives. Organizations affiliated with the Foundation include the Clemson University Continuing Education/Conference Complex Corporation, the Clemson University Real Estate Foundation, and the Wallace F. Pate Foundation for Environmental Research and Education. As of June 30, 2009, the Clemson University Foundation managed over 1,300 endowments. As of December 31, 2009, the combined CUF-CU Endowment totaled \$380 million.

CLEMSON ALUMNI ASSOCIATION

The Clemson Alumni Association's action phrase is "Your Lifelong Connection to Clemson." Its mission is to serve, to inform, to involve. The Alumni Association works for the more than 112,000 alumni located around the world, sponsoring programs to provide a link between students of yesterday, today, and tomorrow.

In conjunction with volunteers and traveling University staff, Clemson Clubs and Clemson activities are conducted around the world. Alumni are kept informed through the award-winning *Clemson World* magazine and at alumni.clemson.edu. Students, alumni, and constituency programs, as well as publications and electronic resources, form the basis for an array of services offered to alumni, students, parents, and friends of the University.

All services of the Alumni Association are coordinated out of the Alumni Center, a campus focal point built, furnished, and equipped entirely by gifts from alumni specifically for that purpose. The University Visitors Center, a gift of the Class of 1944, is adjacent to the Alumni Center and is an excellent stop for anyone visiting or returning to campus.

Alumni-sponsored awards programs such as the Distinguished Service Award, Alumni Fellows, professorships, scholarships, and awards for outstanding teaching, research, and public service are among the prestigious awards given by the Clemson Alumni Association.

Alumni employees coordinate the Alumni Career Services program and the activities of the open-membership student organization, Student Alumni Association. From the Welcome Back Festival held each August to the Senior Picnic held each April, the Alumni Association provides a lifelong connection to Clemson.

CAMPUS VISITS AND TOURS

One of the best ways to discover all Clemson has to offer is through a visit to the campus. The Class of 1944 Visitors Center helps host the Clemson experience of prospective students. Information, audio-visuals, parking passes, and tours are all easily accessible. The Visitors Center is located just off of Highway 93 adjacent to the Alumni Center. Regular hours of operation are Monday-Friday, 8:00 a.m.-4:30 p.m.; Saturday, 9:00 a.m.-4:30 p.m.; and Sunday, 1:00-4:30 p.m. Hours vary according to the academic calendar, University holidays, and the home football schedule.

Walking tours, guided by volunteer student members of the University Guide Association, are available at 9:45 a.m. and 1:45 p.m. Monday-Saturday and 1:45 p.m. on Sundays. Tour schedules also vary based on the academic calendar, University holidays, and the home football schedule. Tours are conducted rain or shine, last about two hours, and include an information segment at the beginning. Reservations are highly recommended and can be arranged on-line at www.clemson.edu/visitors/index.html or by calling (864) 656-4789.

ADMISSION

Complete Admission information is available at www.clemson.edu/admission.

APPLICATION INFORMATION

Applicants should apply on-line at www.clemson.edu. Freshman candidates are especially encouraged to submit preliminary applications and sit for the SAT or ACT during the spring semester of their junior year.

Candidates should understand that admission is closed when all classroom space has been committed. The majority of freshman admission decisions are communicated during the middle of February. Transfer students seeking entrance in August are usually notified between February and July. Candidates must pay a nonrefundable fee of \$60 (subject to change) with the application. This fee is not applicable toward tuition and/or other University fees.

Application Deadlines

For Freshman Applicants	
Spring semester	December 15
Fall semester	
Priority deadline	December 1
Final deadline	May 1

For Transfer Applicants	
Spring semester	December 1
Fall semester	July 1

FRESHMEN

Admission to the University is competitive and is based primarily upon high school curriculum, grades, class standing, and SAT or ACT scores. An applicant's intended major and state residency also receive consideration. To apply for admission, a candidate must submit a high school transcript through his/her counselor and have results of the SAT or ACT sent directly from the testing agency. In addition, all applicants for freshman admission should complete the following courses in high school:

English—4 credits

All four courses must have strong grammar and composition components, with at least one in English literature and at least one in American literature. College preparatory English I, II, III, and IV will meet these requirements.

Mathematics—3 credits

These include algebra I (for which applied mathematics I and II may count together as a substitute if a student successfully completes algebra II), algebra II, and geometry.

Laboratory Science—3 credits

Two must be selected from biology I, chemistry I, or physics I.

Foreign Language—3 credits

All three must be earned in the same language.

Social Sciences—3 credits

American history is required. One-half credit of government and one-half credit of economics are also recommended.

Physical Education/ROTC—1 credit

Other—2 credits

One of these must be a fourth year of mathematics, laboratory science, or foreign language. Students interested in engineering are strongly encouraged to take a fourth year of mathematics. This course should be selected from precalculus, calculus, statistics, or discrete mathematics. The second credit must be in advanced mathematics, computer science, or a combination of these; or one unit of world history, world geography, or western civilization.

The SAT or ACT examination scores, rank in class, academic preparation, and recommendation of the high school counselor will be weighed carefully in the decision-making process. The applicant's acceptance will be confirmed upon presentation of a final high school transcript indicating continued academic progress and graduation.

Entrance Examinations

All freshman candidates and some transfer students must submit scores from either the SAT or ACT. For August enrollment, it is recommended that students complete the SAT or ACT no later than the preceding December. Registration materials for these tests are readily available at high schools or can be obtained by contacting the College Board at

(609) 771-7600 or 1-800-SAT-SCOR or www.collegeboard.com or the American College Testing Service at (319) 337-1313 or www.act.org. The College Board's institutional code for Clemson is 5111. The ACT code for Clemson is 3842. All candidates must have their scores reported directly to Clemson by contacting the appropriate testing agency. Photocopies of student test reports or those submitted by third parties, such as high schools and colleges, are not accepted.

International Baccalaureate (IB) Credit Policy

Clemson University endorses the International Baccalaureate (IB) Program and awards credit for IB Higher Level scores as indicated below.

College Board Advanced Placement Program

The College Board Advanced Placement Program (AP) gives highly motivated high school students an opportunity to begin their college careers during the last year or two of high school. AP participants take college-level courses in high school, sit for nationally administered examinations in the subjects concerned, and submit test grades to Clemson for credit. Credit is awarded to those earning grades of 3, 4, or 5 on AP exams.

IB Higher Level Examination	Level Grade	Credit Allowed Toward Degree	Credits
Anthropology	4, 5, 6, 7	Elective	3
Biology	4, 5, 6, 7	BIOL 103/105, 104/106	8
Business and Management	4, 5, 6, 7	MGT 201	3
Chemistry	4, 5, 6, 7	CH 101	4
	4, 5	(for majors requiring organic chemistry) CH 101	4
	6, 7	(for majors not requiring organic chemistry) CH 101, 102	8
		(for majors not requiring organic chemistry)	
Computing Studies	4	CP SC 111	3
	5, 6	CP SC 101	4
	7	CP SC 101, 102	8
Economics	4, 5, 6, 7	ECON 211, 212	6
English	4	ENGL 101	3
	5, 6	ENGL 101, 212	6
	7	ENGL 101, 103, 212	9
Environmental Systems	4, 5, 6, 7	EN SP 200	3
Foreign Language	4	CHIN 101, FR 101, GER 101, ITAL 101, JAPN 101, or SPAN 101	4
	5, 6, 7	CHIN 101, 102, FR 101, 102, GER 101, 102, ITAL 101, 102, JAPN 101, 102, or SPAN 101, 102	8
Geography	4, 5, 6, 7	GEOG 101	3
History—Americas	4, 5	HIST 101	3
	6, 7	IIIST 101, 102	6
History—European	4, 5, 6, 7	HIST 173	3
Mathematics	4, 5	MTHSC 106 ¹	4
	6, 7	MTHSC 106	4
Music	4, 5, 6, 7	Determined on individual basis	
Philosophy	4, 5, 6, 7	PHIL 101	3
Physics	4	PHYS 207/209	4
	5, 6, 7	PHYS 207/209, 208, 210	8
Psychology	4, 5, 6, 7	PSYCH 201	3
Theatre Arts	4, 5, 6, 7	Determined on individual basis	
Visual Arts	4, 5, 6, 7	ART 103	3

¹For students taking the calculus sequence, MTHSC 106 and 108. Upon completion of MTHSC 108 with a grade of C or better, credit will be given for MTHSC 106.

College Board Advanced Placement Examination		AP Grade	Credit Allowed Toward Degree	Credits
ECONOMICS	Microeconomics	3, 4, 5	ECON 211	3
	Macroeconomics	3, 4, 5	ECON 212	3
ENGLISH	Literature and Composition ¹	3, 4	ENGL 101	3
		5	ENGL 101, 103	6
	Language and Composition ¹	3, 4	ENGL 101	3
		5	ENGL 101, 103	6
	Both Tests	3, 4, 5	ENGL 101, 103	6
	International English Language ¹	3, 4	ENGL 101	3
		5	ENGL 101, 103	6
GOVERNMENT	Government & Politics: United States	3, 4, 5	PO SC 101	3
	Government & Politics: Comparative	3, 4, 5	PO SC 104	3
HISTORY/ GEOGRAPHY	United States History	3	HIST 101	3
		4, 5	HIST 101, 102	6
	European History	3, 4, 5	HIST 173	3
	Human Geography	3, 4, 5	GEOG 101	3
	World History	3, 4, 5	HIST 193	3
HUMANITIES	Music Theory	3, 4, 5	MUSIC 205, 207	4
	Art History	3, 4, 5	A A H 210	3
	Art: Studio Drawing	3, 4, 5	ART 205	3
	Art: Studio 2-D Design	3, 4, 5	ART 103	3
	Art: Studio 3-D Design	3, 4, 5	ART 103	3
LANGUAGES	Chinese Language and Culture	3, 4	CHIN 101, 102, 201	11
		5	CHIN 101, 102, 201, 202	14
	French Language	3, 4, 5	FR 101, 102	8
	German Language	3, 4, 5	GER 101, 102	8
	Japanese Language and Culture	3, 4	JAPN 101, 102, 201	11
		5	JAPN 101, 102, 201, 202	14
	Latin (Vergil)	3	LATIN 101, 102, 201	11
		4, 5	LATIN 101, 102, 201, 202	14
	Spanish Language	3, 4, 5	SPAN 101, 102	8
	Spanish Literature	3	SPAN 101, 102	8
		4	SPAN 101, 102, 201	11
		5	SPAN 101, 102, 201, 202	14
MATHEMATICS	Calculus AB	3, 4, 5	MTHSC 106	4
	Calculus BC ²	3, 4, 5	MTHSC 106, 108	8
	Statistics	3, 4, 5	MTHSC 203	3
PSYCHOLOGY	Psychology	3, 4, 5	PSYCH 201	3
SCIENCE	Biology	3	BIOL 103/105, 104/106	8
		4, 5	BIOL 110, 111	10
	Chemistry	3, 4	CH 101	4
		5	CH 101, 102	8
	Computer Science A	3, 4, 5	CP SC 101	4
	Environmental Science	3, 4, 5	EN SP 200	3
	Physics B ³	3, 4, 5	PHYS 207/209, 208/210	8
	Physics C (Mechanics)	3, 4, 5	PHYS 122/124	4
	Physics C			
	(Electrical and Magnetism)	3, 4, 5	PHYS 221/223	4

¹Students who earn a score of 3 or 4 should register for ENGL 103.²Students who earn a score of 2 on the Calculus BC examination, but have earned a score of 3 (or better) on the AB subscore of the BC examination, may receive credit for MTHSC 106.³Students enrolling in curricula requiring calculus-based physics (PHYS 122, 124, 221, 222, 223, 224), but who earn a grade of 5 on Physics B, will be asked to meet with a departmental representative for further evaluation and placement counseling.

Applicants should be sure to include their social security numbers when registering for AP examinations; this will save time and ensure that credit is automatically awarded to their Clemson academic records.

Dual Enrollment

Dual enrollment courses enable high school students to take college-level courses while earning college credit before graduating from high school. Students should have official transcript(s) sent directly to Clemson's Admissions Office from the registrar of each college or university where credit was earned. A transcript that states "Issued to Student" is considered unofficial. Courses that have previously been evaluated are listed on the Transfer Credit Equivalency List (TCEL) at virtual.clemson.edu/groups/tcel. If a student has taken a course not listed on the TCEL, the course will be evaluated by the Office of Admissions once the student has been accepted by Clemson. Students will be notified by letter of the credit they will receive at Clemson before they enroll in the fall.

South Carolina Governor's School for Science and Mathematics

Clemson awards college credit for selected biology, chemistry, and mathematics courses taken at the South Carolina Governor's School for Science and Mathematics. Credit is awarded to students enrolled at Clemson University who earn A or B in the SCGSSM course(s).

Placement Tests

Mathematics Placement—Freshman mathematics placement is determined by the applicant's score on the Clemson Mathematics Placement Test (CMPT). The CMPT is required for all freshmen and transfer students. Failure to complete the CMPT satisfactorily will result in placement in preparatory work that, in most cases, will not apply toward the general education mathematics requirement. Placement will be adjusted as needed after AP and IB scores have been received by Clemson.

Foreign Language Placement—The Department of Languages offers placement tests that students are required to take during summer orientation. Any student who has had at least one year of a foreign language and who decides to continue with the same language at Clemson, must take one of these tests. Applicants desiring advanced placement in a foreign language may take the College Board's SAT Subject Test, Advanced Placement (AP) Examinations, or the International Baccalaureate (IB) Higher Level Examination. SAT Subject Test scores of 450 or higher enable students to exempt one or more language courses. These students will receive credit following the successful completion (grade of C or better) of a qualifying course at Clemson.

GED

Candidates submitting General Educational Development (GED) credentials in lieu of a high school diploma must be 19 years of age or older. Official GED score results must be received directly from the General Educational Development Testing Service along with an official copy of the high school transcript and SAT or ACT scores. Applicants presenting the GED will be reviewed by the Undergraduate Admissions Committee.

Appeals

Any freshman or transfer candidate who is denied admission may appeal for reconsideration provided the student (1) presents new information, such as improved grades and/or class rank, improved SAT or ACT scores; and (2) submits an on-line statement outlining the rationale for the appeal. All appeals will be reviewed by the Office of Admissions and referred to the Undergraduate Admissions Committee.

Freshman students who are accepted to and enrolled in Clemson University in a conditional admissions program through the appeals process must meet the conditions of their admission or be subject to disenrollment.

Admissions Exceptions

If it is not possible to make a positive decision on the basis of previous academic performance and SAT or ACT scores, other factors, such as special talents or high school profile, may be considered. Where appropriate, the Office of Admissions will refer such cases to the Undergraduate Admissions Committee. Student athletes who do not meet regular admissions standards may be admitted if they meet Atlantic Coast Conference (ACC) and National Collegiate Athletic Association (NCAA) eligibility requirements.

TRANSFER STUDENTS

All transfer applicants must have original transcripts of their coursework sent to Clemson directly from each college or university attended. Unless so stated on the transcript, the applicant should present statements of honorable dismissal and of eligibility to return to the institution last attended. Transfer admission is moderately competitive. To increase their chances for admission, applicants should have the following qualifications:

- Completion of a year of college study after high school graduation with 30 semester hours (or 45 quarter hours) of transferable credit
- A minimum 2.5 grade-point ratio (3.0 preferred). Note: Majors such as Architecture; Communication Studies; Construction Science and Management; Early Childhood Education; Elementary Education; General Engineering; Health Science; Landscape Architecture; Nursing; Parks, Recreation, and Tourism Management (Professional Golf Management); Production Studies in Performing Arts; Secondary Education; Special Education (Social Studies); and Visual Arts have more selective admission standards. Students interested in these majors are encouraged to apply early and contact the Office of Admissions for current admission requirements.
- Freshman-level math, science, and English requirements for the intended major at Clemson
- Present statements of honorable dismissal and of eligibility to return to the institution last attended, unless so stated on the transcript

Application deadlines are December 1 for consideration for the spring semester and July 1 for consideration for the fall semester. In most cases, admission decisions will be made once the year of college study is completed. Summer school applicants should have all credentials sent at least two weeks prior to the beginning of the term. Admission is closed when all classroom space has been committed.

Information regarding transfer from a South Carolina technical college is contained in the brochure *S.C. Technical College Transfer Guide*, available through the Office of Admissions at the address below. Prospective transfer students are also encouraged to refer to the University's Web site at www.clemson.edu or the South Carolina Commission on Higher Education's Web site at www.chc400.state.sc.us.

Students who are unsure to which South Carolina college or university they would like to transfer after their initial coursework at a South Carolina technical college may follow the transfer block system. These transfer blocks are posted at www.clemson.edu/prospectivestudents/transfer/transblock.html. Depending on the student's chosen major, some courses may not be applicable toward graduation requirements. Contact the Office of Admissions for information.

Transfer Admissions Officers

Becky D. Pearson, Associate Director of Admissions
Kathryn Rice, Assistant Director of Admissions
Bonnie G. Duncan, Transfer Credit Coordinator

105 Sikes Hall
Clemson University
Box 345124
Clemson, SC 29634-5124
Phone: (864) 656-2287
FAX: (864) 656-2464

Transfer Credit

Coursework completed with a grade of C or better at other regionally accredited institutions, including correspondence courses, telecourses, on-line courses, and exempted courses, will be evaluated for transfer in terms of equivalent courses required in the Clemson curriculum of the student's choice. This does not guarantee that all courses taken at other institutions will be accepted for transfer. The acceptability of each course or exemption will be determined through an evaluation by the Office of Admissions. To view a listing of how courses have been evaluated previously, visit the Transfer Credit Equivalency List at <http://virtual.clemson.edu/groups/tcel>. Coursework earned at different institutions will not be joined to equate with one Clemson course. No course taken at a nonbaccalaureate-degree granting institution may be used as an equivalent or substitute for any 300- or 400-level Clemson course. Students must submit a registrar's explanation stating that a grade of P or S is equivalent to a C or better before transfer credit may be awarded.

Learning experiences including, but not limited to, military service schools, non-collegiate sponsored instruction, work related experiences, etc. will not be evaluated for transfer; however, enrolled students may request credit by examination from the appropriate department for any non-transferable learning experience. For additional information, see *Advanced Placement and Credit by Examination* on page 24.

Students transferring may select the curriculum that was outlined in the Clemson University Undergraduate Announcements at the time they entered the sending institution, provided they have been in continuous enrollment. Further, transfer students may select any curriculum adopted subsequent to that initial curriculum. After enrolling at Clemson, if transfer students change from one major to another, they will complete all of the requirements included

in the new curriculum that are in effect at the time of the change. If all coursework toward a degree is not completed within six years after the initial enrollment at the sending institution, the student may be required to complete additional courses.

College Board College-Level Examination Program (CLEP)

CLEP is designed primarily for adults with nontraditional learning experiences. This program has very limited recognition at Clemson. A few departments accept credit for CLEP subject-matter examinations; however, CLEP General Examinations are not recognized. Credit is awarded for introductory-level courses according to criteria established by the following departments: Chemistry, English (composition only), and Mathematical Sciences (algebra and trigonometry only). Numerical scores plus essays, required when offered as part of a CLEP examination, will be evaluated by the appropriate department.

ADMISSION DEPOSIT

All accepted freshman and transfer candidates for fall semester are required to submit a nonrefundable \$200 admission deposit. This deposit is applicable toward tuition and other University fees and may be paid by credit card.

HOUSING

All unmarried freshmen who are under the age of 21 at the time of enrollment, who do not live with parent(s) [within a 50-mile radius of campus], are required to live in University-owned housing for the fall and spring semesters.

For the purpose of this agreement, transfer students are not considered freshmen. Transfer students are housed on a space available basis.

ORIENTATION PROGRAMS

The University offers a series of orientation programs during the summer for freshmen and transfer students and their parents/guests. All accepted students are required to attend one of the sessions. During orientation, students will have an opportunity to discuss their educational objectives with an advisor, to register for the fall semester, and to learn about student life and other co-curricular activities. All new students will register for their first semester at Clemson during orientation. For more information about the orientation programs fee structure, visit www.clemson.edu/orientation.

2010 Summer Orientation Dates

Freshmen	New Transfer
June 14-15	June 16 (Bridge Only)
June 17-18	June 30
June 21-22	July 7
June 24-25	July 14
June 28-29	
July 1-2	
July 8-9	
July 12-13	

International students are expected to attend an additional session held on August 13, which is conducted by International Student Programs in the Gantt Center for Student Life.

INTERNATIONAL UNDERGRADUATES

Admissions services for undergraduate international students are provided by the Office of Admissions. International students who come from abroad or transfer from another school must meet academic, language, and financial qualifications as determined by Clemson University. Transcripts, mark sheets, and academic records must be verified by a certified U.S. educational consultant agency. Prospective transfer students must provide translated course descriptions for coursework to be evaluated for Clemson academic credit. The SAT or ACT is required of all international applicants (freshman or transfer). The Test of English as a Foreign Language (TOEFL) is required of applicants from countries where English is not the native language. Financial qualifications are determined by the submission of a financial certification form and bank statements verifying adequate funding. The Office of International Affairs provides visa enabling documents and advising services. For more information, visit www.clemson.edu/ia/. For International Student Procedures and Requirements, visit <http://www.clemson.edu/admissions/undergraduate/requirements/international.html>.

SPECIAL STUDENT STATUS

The special student classification is designed for high school graduates who are 19 years of age or older and wish to take a limited number of courses for personal or professional development. This program is not appropriate for individuals who are interested in earning an undergraduate degree. In addition, it is not a "trial admission" status or one for candidates who apply too late to submit credentials for consideration for regular admission. Applicants denied regular admission to Clemson are not eligible to apply as special students.

None of the usual credentials supporting an application are required of special student applicants. A cumulative maximum of 18 undergraduate credit hours may be taken. Contact the Office of Admissions, 105 Sikes Hall, Clemson, SC 29634-5124.

READMISSION OF FORMER UNDERGRADUATES

Undergraduate students who have previously attended Clemson and wish to return must secure an application for re-entrance from the Registrar's Office, www.clemson.edu/registrar. Students are readmitted to the major they were in when they last attended Clemson, unless the major has been discontinued. Change-of-major forms are available in the Enrolled Student Services Office. Former students must meet the catalog curriculum requirements for graduation in effect at the time of their return. Students are required to satisfy the University's general education requirements in addition to curricular requirements. Any variations in curricular requirements will be considered under the substitution procedures. If all work toward a degree is not completed within six years after entrance, the student may be required to take additional courses. Other information can be obtained from the Registrar's Office.

Any student who is classified as an in-state student for tuition and fees purposes must reaffirm his or her resident status upon application for readmission to the University. If the resident status of an individual changes, that student will be classified as out-of-state for tuition and fees purposes upon readmission to the University. If the resident status is not immediately clear, the student may be required to submit an application for resident status to the Office of Residency Classification.

ILLEGAL IMMIGRATION REFORM ACT PROCESS

Section 59-101-430 of the South Carolina Code of Laws states:

"(A) An alien unlawfully present in the United States is not eligible to attend a public institution of higher learning in this State, as defined in Section 59-103-5. The trustees of a public institution of higher learning in this State shall develop and institute a process by which lawful presence in the United States is verified. In doing so, institution personnel shall not attempt to independently verify the immigration status of any alien, but shall verify any alien's immigration status with the federal government pursuant to 8 U.S.C. Section 1373 (c).

(B) An alien unlawfully present in the United States is not eligible on the basis of residence for a public higher education benefit including, but not limited to, scholarships, financial aid, grants, or resident tuition."

In accordance with section 59-101-430 of the SC Code of Laws, also known as the South Carolina Illegal Immigration Reform Act, the Clemson University Board of Trustees hereby institutes the following process:

I. PROCESS

All applicants to Clemson University are required to verify on their application whether they are a U.S. citizen, Permanent Legal Resident or will be lawfully present in the United States at the time of enrollment on some other grounds. Enrollment at Clemson University for both undergraduate and graduate students is conditioned upon verification of lawful presence in the United States.

South Carolina Code of Law section 59-101-430 prohibits Clemson University from independently verifying the status of any legal alien. An alien's status must be verified with the federal government. Therefore, Clemson University will use either the Student and Exchange Visitor Program (SEVIS), a Web-based technology that tracks and monitors schools and programs, students, exchange visitors and their dependents throughout the duration of approved participation with the U.S. education system, or the Systematic Alien Verification for Entitlements (SAVE) program, Homeland Security's online system of alien status determination or any federal source of information about lawful alien presence that becomes available to Clemson University.

The Board of Trustees delegates responsibility for administering the details of this process to the Provost and the Office of Academic Affairs.

FINANCIAL INFORMATION

The annual State Appropriation Act imposes the general requirement that student fees be fixed by the University Board of Trustees. The act imposes two specific requirements on the board: (1) In fixing fees applicable to academic and general maintenance and operation costs, the board must maintain a minimum student fee not less than the fee charged the previous year. (2) In fixing fees applicable to residence hall rental, dining halls, laundry, infirmary, and all other personal subsistence expenses, the Board must charge students an amount sufficient to cover fully the cost of providing such facilities and services.

The tuition and fees for all students—full or part time and auditing—are available at www.clemson.edu/receivables/fees.htm. Satisfactory settlement of all expenses is a requirement for completing each semester's class registration, and no student is officially enrolled until all past due accounts have been satisfied. Financial aid cannot be used to satisfy balances forward from a prior academic year.

In special cases, the University will accept, at the beginning of a semester, a non-interest-bearing promissory note for a portion of the semester housing and semester meal plan fee. Amounts up to \$1500 may be included in the note. In such cases, a note for the fall semester charges will be due October 1, and for the spring semester, March 1. Failure to pay the note when due will result in the assessment of late fees, including collection costs and denial of future deferred payment note privileges.

Currently enrolled students who expect to continue enrollment may make housing reservations by preregistering on-line during the spring semester at a time designated by the Housing Office.

New students who are offered on-campus housing accommodations must pay a nonrefundable \$50 housing application fee and a \$200 admission deposit. The admissions deposit is deducted from the amount otherwise due for the first semester expenses. (Note: Policies regarding priority to/offering of on-campus housing are subject to change.)

All College of Business and Behavioral Science majors, and other non-majors taking 300- and 400-level courses offered by the college, are required to pay a differential fee to fund significant infrastructure and program enhancements. Additional information about this fee is available at business.clemson.edu/special/enhanced/enhanced_fees.htm.

TUITION AND FEES

Detailed tuition and fee information is available at www.clemson.edu/receivables/fees.htm. Note: A late payment fee will be assessed if fees are not satisfied by published deadlines.

Full-Time Fees

Students must be enrolled in 12 semester hours to pay full-time fees. Students enrolled in less than 12 hours or who drop below 12 hours may become ineligible for some student services, financial aid, or other programs.

Part-Time Fees

Students taking less than 12 semester credit hours will be charged according to the schedule at www.clemson.edu/receivables/fees.htm. These fees do not provide for admission to athletic events, concert series, and other such activities.

Notice to Customers Making Payment by Check

If a check is mailed for payment, it may be converted into an electronic funds transfer (EFT). This means a copy of the check will be made and the account information will be used to debit the bank account electronically for the amount of the check. The debit from the bank account will usually occur within 24 hours and will be shown on the drawer's bank account statement. The original check will not be returned to the drawer. It will be destroyed, but University Revenue and Receivables will retain a copy of it. If the EFT cannot be processed for technical reasons, the drawer authorizes the University to process the copy in place of the original check. If the EFT cannot be completed due to insufficient funds, the University may try twice more to make the transfer. A returned item fee of \$30 will be charged and collected by EFT.

Returned Checks, EFTs, and Credit Card Payments

A check, EFT, or credit card given in payment of University expenses that is returned unpaid by the bank creates an indebtedness to the University. University Revenue and Receivables administers matters relating to the collection of all returned checks for students and non-students.

University Revenue and Receivables will re-present returned items for payment of academic fees. A \$30 fee will be charged for each returned item. If a check is returned or dishonored for any reason, the student's account may be debited electronically for the amount of the check plus the \$30 returned item fee.

In addition, students with returned items for payment of academic fees are also subject to a late payment fee of \$5 per calendar day, not to exceed \$350, beginning on the last day of late registration. If the item is returned to the University in a timely manner with no response from the student or drawer, a written request to disenroll the student will be made to the Registrar. If the request is approved, the percentage of refund will be applied to the debt. If the item is returned after the mid-point of the semester with no response, a decision will be made by the Director of University Revenue and Receivables and the Registrar as to the effect of disenrollment. The University may restrict subsequent payment for academic and other fees by accepting only cash, certified checks, or money orders.

Any individual who uses a two-party check for payment of University expenses will be held responsible for that check if it is returned unpaid by the bank. Items used as payment for various University services such as meal plans, housing, etc., that are later returned unpaid by the bank, give the University the right to cancel such services and cause forfeiture of any refund.

Any returned items not collected by the above procedures may be turned over to a collections agency

and the indebtedness reported to a credit bureau. All collection costs will be added to the debt. Transcripts and diplomas will be withheld pending payment, and the debt may be deducted from state income tax refunds.

Abuse of check payment privileges may result in the restriction of such privileges for an indefinite period of time based on the frequency and/or dollar amount, as determined by University Revenue and Receivables.

Past Due Accounts

Any indebtedness to the University that becomes past due, immediately jeopardizes the student's enrollment, and no such student will be permitted to re-enroll for an ensuing semester or summer term. Billing fees and/or collection costs may be added to the indebtedness. Further, any student who fails to pay all indebtedness, including collection costs, to the University may not be issued a transcript or diploma. Unresolved debts may be turned over to a collections agency, reported to a credit bureau, and deducted from state income tax refunds. Debts include, but are not limited to, parking violations, library fines, rent, and academic fees.

Refund of Academic Fees

(Tuition, University Fee, and Medical Fee) for Students Withdrawing, Dropping to Part Time, or Part-Time Students Dropping Credit Hours

No refunds will be made on a semester's tuition and fees after four weeks from the last day to register. In the case of a withdrawal from the University, refunds will be based on the effective date of the withdrawal. In the case of a withdrawal from a course, refunds will be based on the date the student drops the course using the on-line registration system. To be eligible for a refund, the student's request must be received by University Revenue and Receivables prior to the beginning of the next fall/spring semester or subsequent summer term. Beginning with the day following the last day to register, refunds for periods of four weeks or less during fall/spring semester shall be made on the following basis. Students receiving Title IV Financial Aid follow a different policy. Contact University Revenue and Receivables, G-08 Sikes Hall, for details.

Fall/Spring Semester	
Period of Enrollment	Percent Refund
Registration day(s) in published calendar	100%
After last day to register:	
One week or less	80%
More than 1 but not more than 2 weeks	60%
More than 2 but not more than 3 weeks	40%
More than 3 but not more than 4 weeks	20%
More than 4 weeks	0%

Summer Sessions				
Period of Enrollment	Length of Session Percent Refund			
	Less Than 3 wks.	3 wks.	5 or 6 wks.	More Than 6 wks.
Registration day(s) in published calendar	100%	100%	100%	100%
After last day to register:				
One week or less	0%	40%	60%	60%
More than 1 but not more than 2 weeks	0%	0%	20%	40%
More than 2 but not more than 3 weeks	0%	0%	0%	20%
More than 3 weeks	0%	0%	0%	0%

Refund of Dining Hall Fees

See the section on Dining Services on page 20.

Cancellations of the Housing Contract for All New Students

Cancellation of the Contract Prior to July 31, 2010

(a) Students who sign contracts after July 31, 2010, are bound by all cancellation procedures and charges outlined below.

(b) If cancellation request is received by the Housing Office on or before this date, the contract is cancelled with no additional charge. A new freshman may only use this option if he/she will commute from home [living with parent(s) and only within a 50-mile radius of campus.]

Cancellation of the Contract After July 31, 2010

(a) The contract may be terminated after July 31, 2010 for the following reasons: withdrawal from school; marriage (no more than four weeks prior to the wedding date); or, circumstances determined by the University to be sufficiently extenuating as to warrant cancellation (documentary evidence will be required).

(b) Any student qualifying for cancellation will have his/her bill adjusted appropriately based on the current housing cancellation fee schedule and the circumstances of cancellation.

Appeals Committee

Students are encouraged first to contact the Assignments Office with concerns regarding the contract cancellation process. If the concerns are not resolved satisfactorily, the student is encouraged to submit such concerns to the Appeals Committee.

Cancellation of the Contract Prior to the Start of the Academic Year for All Continuing Students and Former Students Returning

Cancellation of the Contract Prior to July 31, 2010

(a) April 15, 2010—If cancellation request is received by the Housing Office on or before this date, the contract is cancelled without charge. Students who sign contracts after April 15, 2010, are subject to all cancellation procedures and charges outlined below.

(b) April 16–May 15, 2010—If cancellation request is received by the Housing Office on or between these dates, the contract is cancelled, and a \$150 contract cancellation charge is placed on the student's University account.

(c) May 16–June 15, 2010—If cancellation request is received by the Housing Office on or between these dates, the contract is cancelled, and a \$300 contract cancellation charge is placed on the student's University account.

(d) June 16–July 31, 2010—If cancellation request is received by the Housing Office on or between these dates, the contract is cancelled, and a \$500 contract cancellation charge is placed on the student's University account.

(e) In all cases where the student fails to enroll, a \$150 contract cancellation charge is placed on the student's University account. If a student's plans change and he/she re-enrolls after canceling, the full rental charge will be added back to the student's account. The \$150 cancellation charge is waived only in cases where the University denies readmission.

Cancellation of the Contract after July 31, 2010

(a) The contract may be terminated after the start of each semester for the following reasons: withdrawal from school; marriage (no more than four weeks prior to the wedding date); or circumstances determined by the University to be sufficiently extenuating as to warrant cancellation (documentary evidence will be required).

(b) Any student qualifying for cancellation under paragraph (a) above will have his/her bill adjusted appropriately based on the current housing cancellation fee schedule and the circumstances of the cancellation.

Appeals Committee

Students are encouraged first to contact the Assignments Office with concerns regarding the contract cancellation process. If the concerns are not resolved satisfactorily, the student is encouraged to submit such concerns to the Appeals Committee.

Proper Notice of Cancellation Request

Students who desire to request cancellation of this contract must contact University Housing at (864) 656-2295 or housinginfo-l@clemson.edu for instructions.

Refunds of Financial Aid for Students Withdrawing from the University

Refunds of academic fees are made in accordance with semester and summer session refund policies. First semester freshmen and first semester transfers receiving Title IV financial aid are under a different policy based on federal guidelines. Details are available in G-08 Sikes Hall. University housing refunds are made according to the policy above. Meal plan refunds are made on a pro rata basis.

Since financial aid is expected to meet or help meet educational costs, any academic fee, housing, or meal plan fee for students withdrawing from the University up to the amount of financial aid received for that semester or summer session, will be refunded to the Financial Aid Program(s) from which the student received assistance.

Students receiving Title IV Funds (Federal Pell Grant, Academic Competitiveness Grant, National SMART Grant, Federal SEOG, Federal Perkins, Federal Stafford Loans—unsub or sub) or Federal Plus Loans who withdraw from the University are subject to the Return of Title IV Funds regulations. Students with funds from any of these programs earn their financial aid dollars while enrolled. If a student withdraws prior to completing 60% of a term, a prorated portion of the federal financial aid dollars must be considered unearned and returned to the federal programs and could cause students to owe the University a significant amount upon withdrawal.

In addition to the amount of federal aid that Clemson must return, students who received financial aid for other educational costs, including off-campus living expenses, may be required to repay a portion of those funds to the federal programs. Failure to return aid owed to the federal aid programs may result in loss of eligibility for federal aid assistance.

Federal aid funds to be returned are distributed to the programs in the following order:

- Unsubsidized Federal Stafford Loan
- Subsidized Federal Stafford Loan

- Federal Perkins Loan
- Federal Plus Loan
- Federal Pell Grant
- Academic Competitiveness Grant
- National SMART Grant
- Federal SEOG
- Other Title IV Programs
- Non-Title IV Programs

After the refund has been applied to the Title IV and non-Title IV programs, any refund balance will be refunded to the student.

If debts were incurred before withdrawing, such as bad checks, unpaid traffic or library fines, etc., the refund will cover these obligations first. Academic fees, housing, and meal plan refunds for students withdrawing will be paid to the student.

RESIDENT TUITION AND FEES

Application for Resident Status

Any undergraduate student or prospective student whose status concerning entitlement to payment of in-state tuition and fees is uncertain has the responsibility of securing a ruling from the University by providing all relevant information on special application forms. These forms can be obtained from the Student Financial Aid Office, G-01 Sikes Hall, and are to be completed and returned to that office prior to the first day of class for any semester or summer term for which the student is attempting to qualify for payment of the in-state tuition and fee rate. For more information, visit clemson.edu/finaid/ResClass.

Entitlement

Eligibility for payment of in-state tuition and fees shall be determined under the provisions of Sections 59-112-10 through 59-112-100, South Carolina Code of Laws, 1976, as amended. This law is set forth in its entirety as follows (subject to further amendment by the General Assembly).

Statutes

59-112-10—Definitions. As used in this chapter:

A. The words "State Institution" shall mean those post-secondary educational institutions under the jurisdiction of the following: (1) Board of Trustees, Clemson University; (2) Board of Trustees, Medical University of South Carolina; (3) Board of Trustees, South Carolina State College; (4) State College Board of Trustees; (5) Board of Visitors, The Citadel; (6) Board of Trustees, University of South Carolina; (7) Board of Trustees, Winthrop University; and (8) State Board of Technical and Comprehensive Education.

B. The word "student" shall mean any person enrolled for studies in any state institution.

C. The word "residence" or "reside" shall mean continuous and permanent physical presence within this State, provided, that temporary absences for short periods of time shall not affect the establishment of a residence.

D. The word "domicile" shall mean a person's true, fixed, principal residence and place of habitation; it shall indicate the place where such person intends to remain, and to which such person expects to return upon leaving without establishing a new domicile in another state. For purposes of this sec-

tion one may have only one legal domicile; one is presumed to abandon automatically an old domicile upon establishing a new one. Housing provided on an academic session basis for students at State institutions shall be presumed not to be a place of principal residence, as residency in such housing is by nature temporary.

E. The words "in-state rates" shall mean charges for tuition and fees established by State Institutions for persons who are domiciled in South Carolina in accordance with this act; the words "out-of-state rates" shall mean charges for tuition and fees established by State Institutions for persons who are not domiciled in South Carolina in accordance with this act.

F. The words "independent person" shall mean a person in his majority, or an emancipated minor, whose predominant source of income is his own earnings or income from employment, investments, or payments from trusts, grants, scholarships, loans, or payments of alimony or separate maintenance made pursuant to court order.

G. The words "dependent" or "dependent person" mean: (1) one whose financial support is provided not through his own earnings or entitlements, but whose predominant source of income or support is payments from a parent, spouse, or guardian, and who qualifies as a dependent or an exemption on the federal tax return of the parent, spouse, or guardian; or (2) one for whom payments are made, under court order, for child support and the cost of his college education by an independent person meeting the provisions of Section 59-112-20 A or B. However, the words "dependent" or "dependent person" do not include a spouse or former spouse who is the recipient of alimony or separate maintenance payments made pursuant to court order.

H. The word "minor" shall mean a person who has not attained the age of eighteen years; and the words "emancipated minor" shall mean a minor whose parents have entirely surrendered the right to the care, custody and earnings of such minor and are no longer under any legal obligation to support or maintain such minor.

I. The word "parent" shall mean a person's natural or adoptive father or mother; or if one parent has custody of the child, the parent having custody; or if there is a guardian or other legal custodian of such person, then such guardian or legal custodian; provided, however, that where circumstances indicate that such guardianship or custodianship was created primarily for the purpose of conferring South Carolina domicile for tuition and fee purposes on such child or dependent person, it shall not be given such effect.

J. The word "spouse" shall mean the husband or wife of a married person.

59-112-20—South Carolina Domicile Defined for Purposes of Rates of Tuition and Fees. South Carolina domicile for tuition and fee purposes shall be established as follows in determinations of rates of tuition and fees to be paid by students entering or attending State Institutions:

A. Independent persons who reside in and have been domiciled in South Carolina for a period of no less than twelve months with an intention of making a permanent home herein, and their dependents, may be considered eligible for in-state rates.

B. Independent persons who reside in and have been domiciled in South Carolina for fewer than twelve months but who have full-time employment in

the State, and their dependents, may be considered eligible for in-state rates for as long as such independent person is employed on a full-time basis in the State.

C. Where an independent person meeting the provisions of Section 59-112-20 B above, is living apart from his spouse, or where such person and his spouse are separated or divorced, the spouse and dependents of such independent person shall have domiciliary status for tuition and fee purposes only under the following circumstances: (1) if the spouse requesting domiciliary status for tuition and fee purposes remains domiciled in South Carolina although living apart or separated from his or her employed spouse, (2) if the dependent requesting domiciliary status for tuition and fee purposes is under the legal custody or guardianship, as defined in Section 59-112-101 above, of an independent person who is domiciled in this State; or if such dependent is claimed as an income tax exemption by the parent not having legal custody but paying child-support, so long as either parent remains domiciled in South Carolina.

D. The residence and domicile of a dependent minor shall be presumed to be that of the parent of such dependent minor.

59-112-30—Effect of Change of Residency. When the domicile of a student or of the person upon whom a student is financially dependent changes after enrollment at a State Institution, tuition charges shall be adjusted as follows:

A. Except as provided in Section 59-112-20B above, when domicile is taken in South Carolina, a student shall not become eligible for in-state rates until the beginning of the next academic session after expiration of twelve months from date of domicile in this State.

B. When South Carolina domicile is lost, eligibility for in-state rates shall end on the last day of the academic session in which the loss occurs; however, application of this subsection shall be at the discretion of the institution involved.

C. Notwithstanding the other provisions of this section, any dependent person who has been domiciled with his family in South Carolina for a period of not less than three years immediately prior to his enrollment may enroll in a state-supported institution of higher learning at the in-state rate and may continue to be enrolled at such rate even if the parent, spouse, or guardian upon whom he is dependent moves his domicile from this State.

59-112-40—Effect of Marriage. Except as provided in Section 59-112-20 above, marriage shall affect determinations of domicile for tuition and fee purposes only insofar as it operates to evince an intention by the parties to make a permanent home in South Carolina.

59-112-50—Military Personnel and Their Dependents. Notwithstanding other provisions of this act, during the period of their assignment to duty in South Carolina members of the armed services of the United States stationed in South Carolina and their dependents may be considered eligible for in-state rates. When such armed service personnel are ordered away from the State, their dependents may continue for an additional twelve months to have this eligibility at the State Institutions where they are enrolled at the time such assignment ends. Such persons and their dependents may be considered eligible for in-state rates for a period of twelve months after their discharge from the armed services even

though they were not enrolled at a State Institution at the time of their discharge, if they have evinced an intent to establish domicile in South Carolina and if they have resided in South Carolina for a period of at least twelve months immediately preceding their discharge.

59-112-60—Faculty, Administrative Employees and Dependents Thereof. Full-time faculty and administrative employees of State Institutions, and the spouses and children of such persons, shall be excluded from the provision of this act.

59-112-70—Abatement of Rates for Nonresidents on Scholarship. Notwithstanding other provisions of this act, the governing boards listed in Section 59-112-10A above, are authorized to adopt policies for the abatement of any part or all of the out-of-state rates for students who are recipients of scholarship aid.

59-112-80—Administration of Chapter; Burden of Proving Eligibility of Students. Each State Institution shall designate an official to administer the provisions of this act. Students making application to pay tuition and fees at in-state rates shall have the burden of proving to the satisfaction of the aforesaid officials of State Institutions that they have fulfilled the requirements of this act before they shall be permitted to pay tuition and fees at such rate.

59-112-90—Penalties for Willful Misrepresentation. Where it appears to the satisfaction of officials charged with administration of these provisions that a person has gained domiciliary status improperly by making or presenting willful misrepresentations of fact, such persons should be charged tuition and fees past due and unpaid at the out-of-state rate, plus interest at a rate of eight percent per annum, plus a penalty amounting to twenty-five percent of the out-of-state rate for one semester; and until these charges have been paid no such student shall be allowed to receive transcripts or graduate from any State Institution.

59-112-100—Regulations. The Commission on Higher Education may prescribe uniform regulations for application of the provisions of this act and may provide for annual review of such regulations.

ARTICLE V

Determination of Rates of Tuition and Fees

(Statutory Authority: 1976 Code Sections 59-112-10 to 59-112-100)

62-600. Rates of Tuition and Fees.

A. Resident classification is an essential part of tuition and fee determination, admission regulations, scholarship eligibility, and other relevant policies of the state. It is important that institutions have fair and equitable regulations that can be administered consistently and are sensitive to the interests of both students and the state. The Commission on Higher Education hereby establishes regulations for the Statute Governing Residency for Tuition and Fee Purposes to be applied consistently by all South Carolina institutions of higher education. These regulations do not address residency matters relating to in county categories used within the State's technical colleges.

B. Institutions of higher education are required by the Statute to determine the residence classification of applicants. The initial determination of one's resident status is made at the time of admission. The

determination made at that time, and any determination made thereafter, prevails for each subsequent semester until information becomes available that would impact the existing residency status and the determination is successfully challenged. The burden of proof rests with the students to show evidence as deemed necessary to establish and maintain their residency status.

62-601. Code of Laws Governing Residence.

Rules regarding the establishment of legal residence for tuition and fee purposes for institutions of higher education are governed by Title 59, Chapter 112 of the 1976 South Carolina Code of Laws, as amended.

62-602. Definitions.

A. "Academic Session" is defined as a term or semester of enrollment. (62-607.B)

B. "Continue to be Enrolled" is defined as continuous enrollment without an interruption that would require the student to pursue a formal process of readmission to that institution. Formal petitions or applications for change of degree level shall be considered readmissions. (62-607.A)

C. "Dependent Person" is defined as one whose predominant source of income or support is from payments from a parent, spouse, or guardian, who claims the dependent person on his/her federal income tax return. In the case of those individuals who are supported by family members who do not earn enough reportable income for taxation purposes, a dependent person can be defined as one who qualifies as a dependent or exemption on the federal income tax return of the parent, spouse, or guardian. A dependent person is also one for whom payments are made, under court order, for child support and the cost of the dependent person's college education. A dependent person's residency is based upon the residency of the person upon whom they are dependent. (62-602.G) (62-602.N) (62-603.B) (62-605.C) (62-607.A)

D. "Domicile" is defined as the true, fixed, principal residence and place of habitation. It shall indicate the place where a person intends to remain, or to where one expects to return upon leaving without establishing a new domicile in another state. For purposes of this section, one may have only one legal domicile. One is presumed to abandon automatically an old domicile upon establishing a new one. Housing provided on an academic session basis for student at institutions shall be presumed not to be a place of principal residence, as residency in such housing is by its nature temporary. (62-602.E) (62-602.K) (62-602.M) (62-602.N) (62-603.A) (62-603.B) (62-605.B) (62-605.C) (62-607.A) (62-607.B) (62-608.A) (62-608.C) (62-608.D) (62-609.A.3) (62-609.A.4)

E. "Family's Domicile in this State is Terminated" is defined as an employer directed transfer of the person upon whom the student is dependent and is not construed to mean a voluntary change in domicile. Also included is a relocation of the person upon whom the student is dependent who is laid off through no fault of their own, e.g., plant closure, downsizing, etc., who accepts employment in another state prior to relocating. (62-607.A)

F. "Full time employment" is defined as employment that consists of at least thirty seven and one half hours a week on a single job in a full time status, with gross earnings of at least minimum wage. However, a person who works less than thirty seven and one half hours a week but receives or is entitled to receive full time employee benefits shall be considered to be employed full time if such status is verified by the

employer. A person who meets the eligibility requirements of the Americans with Disabilities Act must present acceptable evidence that they satisfy their prescribed employment specifications in order to qualify as having full time employment. (62-605.C.1) (62-609.A.2) (62-609.A.3)

G. "Guardian" is defined as one legally responsible for the care and management of the person or property of a minor child based upon the five tests for dependency prescribed by the Internal Revenue Service; provided, however, that where circumstances indicate that such guardianship or custodianship was created primarily for the purpose of conferring South Carolina domicile for tuition and fee purposes on such child or dependent person, it shall not be given such effect. (62-602.C) (62-602.E) (62-602.I) (62-602.M) (62-603.B) (62-605.C)

H. "Immediately Prior" is defined as the period of time between the offer of admission and the first day of class of the term for which the offer was made, not to exceed one calendar year. (62-607.A)

I. "Independent Person" is defined as one in his/her majority (eighteen years of age or older) or an emancipated minor, whose predominant source of income is his/her own earnings or income from employment, investments, or payments from trusts, grants, scholarships, commercial loans, or payments made in accordance with court order. An independent person must provide more than half of his or her support during the twelve months immediately prior to the date that classes begin for the semester for which resident status is requested. An independent person cannot claim the domicile of another individual as their own for the purposes of establishing intent to become a South Carolina resident. An independent person must have established his/her own domicile for twelve months prior to receiving in-state tuition and fees. An independent person cannot be claimed as a dependent or exemption on the federal tax return of his or her parent, spouse, or guardian for the year in which resident status is requested. (62-602.N) (62-603.A) (62-605.C) (62-607.B) (62-608.B)

J. "Minor" is defined as a person who has not attained the age of eighteen years. An "emancipated minor" shall mean a minor whose parents have entirely surrendered the right to the care, custody and earnings of such minor and are no longer under any legal obligation to support or maintain such minor. (62-602.G)

K. "Non-resident Alien" is defined as a person who is not a citizen or permanent resident of the United States. By virtue of their non-resident status "non-resident aliens" generally do not have the capacity to establish domicile in South Carolina. (62-602.M) (62-604.A)

L. "Parent" is defined as the father, mother, stepfather, stepmother, foster parent or parent of a legally adopted child. (62-602.C) (62-602.E) (62-602.I) (62-602.J) (62-602.M) (62-603.B) (62-603.C) (62-605.C)

M. "Reside" is defined as continuous and permanent physical presence within the State, provided that absences for short periods of time shall not affect the establishment of residence. Excluded are absences associated with requirements to complete a degree, absences for military training service, and like absences, provided South Carolina domicile is maintained. (62-603.A) (62-606.B) (62-609.A) (62-609.A.3) (62-609.A.4) (62-609.B)

N. "Resident" for tuition and fee purposes is defined as an independent person who has abandoned all prior domiciles and has been domiciled in South Carolina continuously for at least twelve months

immediately preceding the first day of class of the term for which resident classification is sought and for whom there is an absence of domiciliary evidence in other states or countries, notwithstanding other provisions of the Statute. (62-600.A) (62-600.B) (62-602.1) (62-602.K) (62-602.M) (62-603.A) (62-603.B) (62-603.C) (62-604.A) (62-605.A) (62-605.C) (62-605.C.7) (62-606.A) (62-606.A.5) (62-606.B) (62-607.A) (62-608.B) (62-609.A.3) (62-610.A) (62-610.B) (62-611.A) (62-611.B)

O. "Spouse" is defined as the husband or wife of a married person in accordance with Title 20, Chapter 1 of the 1976 South Carolina Code of Laws, as amended. (62-602.C) (62-602.E) (62-602.I) (62-602.M) (62-603.B) (62-605.C)

P. "Temporary Absence" is defined as a break in enrollment during a fall or spring semester (or its equivalent) during which a student is not registered for class. (62-606.A)

Q. "Terminal Leave" is defined as a transition period following active employment and immediately preceding retirement (with a pension or annuity), during which the individual may use accumulated leave. (62-609.A.4)

R. "United States Armed Forces" is defined as the United States Air Force, Army, Marine Corps, Navy, and Coast Guard. (62-606.B) (62-609.A(1))

S. "Trust" is defined as a legal entity created by a grantor for the benefit of designated beneficiaries under the laws of the state and the valid trust instrument. However, that where circumstances indicate that such trust was created primarily for the purpose of conferring South Carolina domicile for tuition and fee purposes on such child or independent person, it shall not be given such effect.

62-603. Citizens and Permanent Residents.

A. Independent persons who have physically resided and been domiciled in South Carolina for twelve continuous months immediately preceding the date the classes begin for the semester for which resident status is claimed may qualify to pay in-state tuition and fees. The twelve month residency period starts

when the independent person establishes the intent to become a South Carolina resident per Section 62-605 entitled "Establishing the Requisite Intent to Become a South Carolina Domiciliary." The twelve month residency period cannot start until the absence of indicia in other states is proven. Absences from the State during the twelve month period may affect the establishment of permanent residence for tuition and fee purposes.

B. The resident status of a dependent person is based on the resident status of the person who provides more than half of the dependent person's support and claims or, only in the case of those individuals who are supported by family members who do not earn enough reportable income for taxation purposes, qualifies to claim the dependent person as a dependent for federal income tax purposes. Thus, the residence and domicile of a dependent person shall be presumed to be that of their parent, spouse, or guardian.

C. In the case of divorced or separated parents, the resident status of the dependent person may be based on the resident status of the parent who claims the dependent person as a dependent for tax purposes; or based on the resident status of the parent who has legal custody or legal joint custody of the dependent person; or based on the resident status of the person who makes payments under a court order for child support and at least the cost of his/her college tuition and fees.

62-604. Non-Resident Aliens, Non-Citizens, and Non-Permanent Residents.

A. Except as otherwise specified in this section or as provided in Section 62-609 (1) & (2), independent non-citizens and non-permanent residents of the United States will be assessed tuition and fees at the non-resident, out of state rate. Independent non-resident aliens, including refugees, asylees, and parolees may be entitled to resident, in state classification once they have been awarded permanent resident status by the U.S. Department of Justice and meet all the statutory residency requirements provided that all other domiciliary requirements are met. Time spent living in South Carolina immediately prior to the awarding of permanent resident status does not count toward the twelve month residency period. Certain non resident aliens present in the United States in specified visa classifications are eligible to receive in state residency status for tuition and fee purposes as prescribed by the Commission on Higher Education. They are not, however, eligible to receive state sponsored tuition assistance/scholarships.

B. Title 8 of the Code of Federal Regulations (CFR) serves as the primary resource for defining visa categories.

62-605. Establishing the Requisite Intent to Become a South Carolina Domiciliary.

A. Resident status may not be acquired by an applicant or student while residing in South Carolina for the primary purpose of enrollment in an institution or for access to state supported programs designed to serve South Carolina residents. An applicant or student from another state who comes to South Carolina usually does so for the purpose of attending school. Therefore, an applicant or student who enrolls as a non-resident in an institution is presumed to remain a non-resident throughout his or her attendance and does not qualify under any of the residency provisions.

B. If a person asserts that his/her domicile has been established in this State, the individual has the burden of proof. Such persons should provide to the designated residency official of the institution to which they are applying any and all evidence the person believes satisfies the burden of proof. The residency official will consider any and all evidence provided concerning such claim of domicile, but will not necessarily regard any single item of evidence as conclusive evidence that domicile has been established.

C. For independent persons or the parent, spouse, or guardian of dependent persons, examples of intent to become a South Carolina resident may include, although any single indicator may not be conclusive, the following indicia:

- (1) Statement of full time employment;
- (2) Designating South Carolina as state of legal residence on military record;
- (3) Possession of a valid South Carolina driver's license, or if a non-driver, a South Carolina identification card. Failure to obtain this within 90 days of the establishment of the intent to become a South Carolina resident will delay the beginning date of residency eligibility until a South Carolina driver's license is obtained;
- (4) Possession of a valid South Carolina vehicle registration card. Failure to obtain this within 45 days of the establishment of the intent to become a South Carolina resident will delay the beginning date of residency eligibility until the applicant obtains a South Carolina vehicle registrations card;

- (5) Maintenance of domicile in South Carolina;
- (6) Paying South Carolina income taxes as a resident during the past tax year, including income earned outside of South Carolina from the date South Carolina domicile was claimed;
- (7) Ownership of principal residence in South Carolina; and
- (8) Licensing for professional practice (if applicable) in South Carolina.

D. The absence of indicia in other states or countries is required before the student is eligible to pay in state rates.

62-606. Maintaining Residence.

A. A person's temporary absence from the State does not necessarily constitute loss of South Carolina residence unless the person has acted inconsistently with the claim of continued South Carolina residence during the person's absence from the State. The burden is on the person to show retention of South Carolina residence during the person's absence from the State. Steps a person should take to retain South Carolina resident status for tuition and fee purposes include:

- (1) Continuing to use a South Carolina permanent address on all records;
- (2) Maintaining South Carolina driver's license;
- (3) Maintaining South Carolina vehicle registration;
- (4) Satisfying South Carolina resident income tax obligation. Individuals claiming permanent residence in South Carolina are liable for payment of income taxes on their total income from the date that they established South Carolina residence. This includes income earned in another state or country.

B. Active duty members of the United States Armed Forces and their dependents are eligible to pay in state tuition and fees as long as they continuously claim South Carolina as their state of legal residence during their military service. Documentation will be required in all cases to support this claim. South Carolina residents who change their state of legal residence while in the military lose their South Carolina resident status for tuition and fee purposes.

62-607. Effect of Change of Residence.

A. Notwithstanding other provisions of this section, any dependent person of a legal resident of this state who has been domiciled with his/her family in South Carolina for a period of not less than three years and whose family's domicile in this state is terminated immediately prior to his/her enrollment may enroll at the in state rate. Any dependent person of a legal resident of this state who has been domiciled with his/her family in South Carolina for a period of not less than three years and whose family's domicile in this state is terminated after his/her enrollment may continue to receive in state rates, however, a student must continue to be enrolled and registered for classes (excluding summers) in order to maintain eligibility to pay in state rates in subsequent semesters. Transfers within or between South Carolina colleges and universities of a student seeking a certificate, diploma, associate, baccalaureate, or graduate level degree does not constitute a break in enrollment.

B. If a dependent or independent person voluntarily leaves the state, and information becomes available that would impact the existing residency status, eligibility for in state rates shall end on the last day of

the academic session during which domicile is lost. Application of this provision shall be at the discretion of the institution involved. However, a student must continue to be enrolled and registered for classes (excluding summers) in order to maintain eligibility to pay in state rates in subsequent semesters.

62-608. Effect of Marriage.

A. In ascertaining domicile of a married person, irrespective of gender, such a review shall be determined just as for an unmarried person by reference to all relevant evidence of domiciliary intent.

B. If a non-resident marries a South Carolina resident, the non-resident does not automatically acquire South Carolina resident status. The non-resident may acquire South Carolina resident status if the South Carolina resident is an independent person and the non-resident is a dependent of the South Carolina resident.

C. Marriage to a person domiciled outside South Carolina shall not be solely the reason for precluding a person from establishing or maintaining domicile in South Carolina and subsequently becoming eligible or continuing to be eligible for residency.

D. No person shall be deemed solely by reason of marriage to a person domiciled in South Carolina to have established or maintained domicile in South Carolina and consequently to be eligible for or to retain eligibility for South Carolina residency.

62-609. Exceptions.

A. Persons in the following categories qualify to pay in state tuition and fees without having to establish a permanent home in the state for twelve months. Persons who qualify under any of these categories must meet the conditions of the specific category on or before the first day of class of the term for which payment of in state tuition and fees is requested. The following categories apply only to in state tuition and do not apply to State supported scholarships and grants. Individuals who qualify for in state tuition and fees under the following exceptions do not automatically qualify for LIFE, SC HOPE or Palmetto Fellows Scholarships.

(1) "Military Personnel and their Dependents": Members of the United States Armed Forces who are permanently assigned in South Carolina on active duty and their dependents are eligible to pay in state tuition and fees. When such personnel are transferred from the State, their dependents may continue to pay in state tuition and fees as long as they are continuously enrolled. Such persons (and their dependents) may also be eligible to pay in state tuition and fees as long as they are continuously enrolled after their discharge from the military, provided they have demonstrated an intent to establish a permanent home in South Carolina and they have resided in South Carolina for a period of at least twelve months immediately preceding their discharge. Military personnel who are not stationed in South Carolina and former military personnel who intend to establish South Carolina residency must fulfill the twelve month "physical presence" requirement for them or their dependents to qualify to pay in state tuition and fees.

(2) "Faculty and Administrative Employees with Full Time Employment and their Dependents". Full time faculty and administrative employees of South Carolina state supported colleges and universities and their dependents are eligible to pay in state tuition and fees.

(3) "Residents with Full Time Employment and their Dependents:" Persons who reside, are domiciled, and are full time employed in the State and who continue to work full time until they meet the twelve month requirement and their dependents are eligible to pay in state tuition and fees, provided that they have taken steps to establish a permanent home in the State. Steps an independent person must take to establish residency in South Carolina are listed in Section 62-605 entitled ("Establishing the Requisite Intent to Become a South Carolina Domiciliary").

(4) "Retired Persons and their Dependents:" Retired persons who are receiving a pension or annuity who reside in South Carolina and have been domiciled in South Carolina as prescribed in the Statute for less than a year may be eligible for in state rates if they maintain residence and domicile in this State. Persons on terminal leave who have established residency in South Carolina may be eligible for in state rates even if domiciled in the State for less than one year if they present documentary evidence from their employer showing they are on terminal leave. The evidence should show beginning and ending dates for the terminal leave period and that the person will receive a pension or annuity when he/she retires.

B. South Carolina residents who wish to participate in the Contract for Services program sponsored by the Southern Regional Education Board must have continuously resided in the State for other than educational purposes for at least two years immediately preceding application for consideration and must meet all other residency requirements during this two year period.

62-610. Application for Change of Resident Status.

A. Persons applying for a change of resident classification must complete a residency application/petition and provide supporting documentation prior to a reclassification deadline as established by the institution.

B. The burden of proof rests with those persons applying for a change of resident classification who must show required evidence to document the change in resident status.

62-611. Incorrect classification.

A. Persons incorrectly classified as residents are subject to reclassification and to payment of all nonresident tuition and fees not paid. If incorrect classification results from false or concealed facts, such persons may be charged tuition and fees past due and unpaid at the out of state rate. The violator may also be subject to administrative, civil, and financial penalties. Until these charges are paid, such persons will not be allowed to receive transcripts or graduate from a South Carolina institution.

B. Residents whose resident status changes are responsible for notifying the Residency Official of the institution attended of such changes.

62-612. Inquiries and Appeals.

A. Inquiries regarding residency requirements and determinations should be directed to the institutional residency official.

B. Each institution will develop an appeals process to accommodate persons wishing to appeal residency determinations made by the institution's residency official. Each institutions appeal process should be directed by that institutions primary residency officer, in conjunction with those individuals who practice the application of State residency regulations

on a daily basis. The professional judgment of the residency officer and administrators will constitute the institutional appeal process. Neither the primary residency official nor appellate official(s) may waive the provisions of the Statute or regulation governing residency for tuition and fee purposes.

DINING SERVICES

The University provides a variety of meal plans to meet student needs. The meal plan dining halls, Harcombe, Schilleter, and Clemson House, are located in different areas of the campus and feature an unlimited seconds policy. Meals may also be purchased on a cash basis or by using a debit/credit card, TigerStripe, or Paw Point account. Meal plans become effective when University housing is opened for occupancy at the beginning of each semester and expire after the evening meal on the day of graduation at the end of each semester. Meal plans are not effective during official University breaks.

The Eastside Food Court, Einstein Brothers Bagels, the Canteen, Java City Cyber Café, and Fernow Street Café provide a wide assortment of dining selections on an a la carte basis. Nationally branded food concepts are available in cash dining facilities on campus: Burger King and Li'l Dino Subs in the Eastside Food Court, Chick-fil-A at the Union Canteen, Pizza Hut Express in the Fernow Street Café, and Chili's, Too in the Johnstone Complex next to Harcombe Dining Hall. All retail dining facilities and dining halls accept cash, credit/debit cards, and TigerStripe and Paw Point cards.

All first-year freshmen who live in University housing, excluding apartments with kitchens, are required to subscribe to one of the following meal plans for their first two semesters: Any 15, Plus Any 15, Seven Day (Unlimited Access), or Plus Unlimited Access. All other students may choose a meal plan on a semester basis or pay for individual meals. First-year freshmen living in University housing (excluding the aforementioned housing) may terminate their meal plan for one of the following reasons:

- withdrawal from the University
- change in housing assignment to an apartment with kitchen facilities
- medical condition with dietary requirements that cannot be met by Dining Services. Documentation from a medical doctor must be provided along with specific dietary requirements. This documentation will be reviewed by the Dining Services Food Service Administrator
- other circumstances determined by the University to be beyond the student's control

Freshmen students must provide the necessary documentation for any of the above reasons before cancellation of their meal plan will be considered. Upperclassmen may terminate their meal plans for any reason. Failure to participate in a meal plan does not automatically release a student from the freshman requirement to subscribe to a meal plan.

Students may change meal plans at the Tiger 1 Card Office in 104 Fike Recreation Center only on certain dates. The dates for fall semester of 2010 are August 30 and September 1, 6 and 8. The dates for spring semester of 2011 are January 24, 26 and 31 and February 2. All adjustments will be prorated. Students may upgrade meal plans during the registration period.

Meal plans cancelled for any reason after service of the first meal will result in a refund of advance payment, minus a \$35 termination charge, and a weekly charge for meals available. The meals available charge applies to the meals that have been served, not those that have been eaten by the individual student. The Paw Points, which are associated with the Plus plans, are not refundable; however, they do carry forward to the next semester. Students will be responsible for all service charges related to changes or termination of a meal plan. Note: Meal plans may not be shared with other students. Only the meal plan purchaser may utilize his/her meal plan.

TIGERSTRIPE ACCOUNT

The TigerStripe account is equivalent to a prepaid debit card. As items are purchased from any of the more than 200 locations that accept TigerStripe, both on and off campus, the amount spent is deducted from the TigerStripe account balance. All students are eligible. Funds may be added to the account via the Tiger 1 On-Line Card Office at www.tiger1.clemson.edu. Students may also pay in person at the Tiger 1 Card Office with cash, check, or credit card; or they may call (864) 656-0763 to pay with American Express, Discover, MasterCard or Visa. Office hours are Monday-Friday, 8:00 a.m.-4:30 p.m.

TigerStripe accounts are non-refundable except for students withdrawing, graduating, or not returning to the University. TigerStripe cannot be used for the payment of tuition. Transactions are limited to \$250 per day in the University Revenue and Receivables Office for the payment of incidental fees. Credit balances at the end of each semester will carry forward to the next term. (Students withdrawing must go to E-103 Martin Hall. Balances greater than \$5 will be refunded.) Any indebtedness to the University will be deducted from refunds. All graduating students are required to request a refund at www.tiger1-L@clemson.edu two weeks prior to graduation. Any account that remains dormant for 18 months or longer will have the balance transferred to a University scholarship account.

More information is available at www.tiger1.clemson.edu, by calling (864) 656-0763, or e-mailing tiger1-L@clemson.edu.

FINANCIAL AID

The Office of Student Financial Aid administers and coordinates various types of undergraduate financial aid administered by Clemson University: scholarships, loans, grants, and work-study employment. The office works jointly with the University Scholarships and Awards Committee.

Students may apply after January 1 for financial assistance for the next academic year. Financial aid requests, based on financial need, must be supported by a processed Free Application for Federal Student Aid (FAFSA) and renewed annually. No application is required for the LIFE Scholarship.

The FAFSA must be submitted by March 1 for need-based scholarship consideration and by April 1 for the Federal Supplemental Educational Opportunity Grant (FSEOG), Federal Work-Study, Federal Perkins Loan, and South Carolina State Need-Based Grant. April 1 is the suggested deadline for application for

the Federal Pell Grant and the Federal Stafford Loan. June 15 is the suggested deadline for application for private/alternative loans and the Federal PLUS Loan. PLUS and private loans require a separate application.

Transfer students applying for student loans will be considered as entering freshmen in determining maximum loan limits. Following enrollment, after the credit evaluation process has been completed, students may submit a request for additional funds due to changes in class standing.

Information regarding financial aid programs at Clemson University is available at www.clemson.edu/finaid or from the Student Financial Aid Office, G-01 Sikes Hall, Box 345123, Clemson, SC 29634-5123.

Satisfactory Academic Progress for Financial Aid Eligibility

Students must maintain satisfactory academic progress to be eligible for financial aid. This policy contains both qualitative (grade-point ratio) and quantitative (credit hours completed) requirements. Students must meet the grade-point ratio requirement as stated under the Academic Eligibility Policy. Students must also complete 12, 9, or 6 hours per semester according to their enrollment (full time, three-quarters time, or half time) as of the last day to add a class. Students have a maximum of 12 full-time semesters in which to finish their degrees, or the equivalent in part-time enrollment. Duplicate credits, including courses repeated for Academic Redemption, do not count as credits completed for satisfactory academic progress. Details are available at www.clemson.edu/finaid. Students wishing to appeal their academic progress status may submit a letter to the Student Financial Aid Office. This appeals process is separate from the Appeals Committee on Academic Eligibility. Students returning under the academic renewal policy who apply for financial aid should also submit a letter to the Student Financial Aid Office to update their academic progress record. Prior terms will be counted in the 12 semesters allowed for satisfactory academic progress.

Educational Benefits for Veterans, War Orphans, and Children of Deceased or Disabled Law Enforcement Officers or Fire Fighters

The Veterans Administration provides educational assistance for veterans and children of deceased or totally disabled veterans who meet requirements of applicable laws and regulations. Any veteran or child of a deceased or totally disabled veteran should communicate with the nearest Veterans Administration Office to determine whether he/she is entitled to any educational benefits. Free tuition is available to children of South Carolina law enforcement officers or fire fighters who were totally disabled or killed in the line of duty. Certification is required from the agency of the parent's employment. Upon presentation of proof of eligibility, a student shall not become eligible for educational assistance until the beginning of the next academic term.

Educational Benefits for Senior Citizens

South Carolina residents who are at least 60 years of age may qualify for free tuition. Applicants who are auditing classes must obtain an audit card and waiver application form from the Registrar's Office in 102 Sikes Hall to initiate enrollment each semester. Degree-seeking students must complete a waiver application form through the Financial Aid Office in G-01 Sikes Hall each semester. The waiver must be submitted prior to the first day of class and is not retroactive to prior terms. All questions should be directed to the Financial Aid Office at (864) 656-2280.

STUDENT SERVICES

HOUSING

Single Student Housing

University Housing provides a "home away from home" for approximately 6,100 single students in 24 residence halls, four apartment complexes, and the Clemson House. Most rooms are double occupancy, but there are a limited number of single rooms available. Most two-bedroom apartments accommodate four students. All University housing is equipped to meet the needs of today's college student. Approximately two weeks after acceptance to the University, housing information will be mailed to students. Incoming freshmen should apply for on-campus housing at www.clemson.edu/housing. Transfer students and former students returning are offered on-campus housing if space is available.

REDFERN HEALTH CENTER

Medical Services

Redfern Health Center, an outpatient facility, operates Monday–Friday, 8:00 a.m.–5:00 p.m. (summer and break hours, 8:00 a.m.–4:30 p.m.) Students are seen on an appointment basis. Students without appointments are seen in the Nurses Clinic. The student health center offers outpatient ambulatory care for illnesses and injury, pharmacy, lab, x-ray, and specialty clinics including women's health and allergy/immunization clinics.

Medical clearance is required for all students enrolled at the University. For information regarding immunization requirements, visit the Redfern Health Center Web site at <http://www.clemson.edu/studentaffairs/redfern/eligreq/immunizationreq.php>. A tuberculin skin test (PPD) is required only for students coming from countries identified as being high risk for tuberculosis by the U.S. Centers for Disease Control and Prevention (CDC) and/or the American College Health Association. The PPD skin test must be done at Clemson. Test results from a student's home country will not be accepted. Students not in compliance with immunization requirements will not be allowed to complete registration for the next semester and may be subject to a late fee.

After Hours

Emergency 911 services are available after hours. Students with questions about their health care needs should call the NurseLine at 1-888-525-1333. A registered nurse is available by telephone to answer questions and offer advice about health care needs.

Students requiring the care of a physician after hours choose from area emergency rooms and urgent care facilities, including Clemson Health Center (an urgent care facility), Oconee Medical Center, AnMed Health Center, Palmetto Baptist Medical Center, and Greenville Memorial Medical Center. Medical costs incurred are the student's responsibility. Students should contact Redfern the next business day for follow-up care.

The University ambulance transports on-campus medical emergencies to the closest community medical resource. The University ambulance is staffed with licensed emergency medical personnel 24 hours a day. Students are required to pay for off-campus ambulance transportation.

Counseling and Psychological Services (CAPS)

Located within (and administratively a part of) Redfern Health Center, CAPS provides comprehensive mental health services from a holistic perspective. Students are seen within their context and developmental stages as psychotherapy/counseling is delivered in individual, group, or couples format. Specialized services are delivered by a psychiatrist and addictions counselors. All services are confidential. Students who pay the health fee are allowed up to ten individual counseling sessions per semester at no charge. Services not covered by the health fee are discussed before services are provided.

CAPS offers the convenience of accessing services Monday through Friday from 10:00 a.m.–2:30 p.m. through the walk-in clinic. Students complete paperwork and are seen for this initial brief evaluation on a first-come, first-served basis. Students who cannot meet the walk-in clinic times may call 656-2451 for an appointment during the 8:00 a.m.–5:00 p.m. hours of operation.

The Assessment, Choices, Transitions and Training (ACTT) Program assists students with substance misuse/abuse concerns. CU CARES provides counseling, advocacy, referral, education, and support for students with concerns about sexual assault and relationship violence. Students with eating concerns/disorders are treated from a multidisciplinary approach that involves psychological and medical perspectives. Students are referred out for nutritional consultations. CAPS conducts a limited number of psychological evaluations for learning disabilities and attention disorders on a first-come, first-served basis each semester.

In case of emergency, assistance and consultation are available by calling 656-2451 during regular business hours. After hours and on weekends, the on-call counselor can be reached through the University Police Department at 656-2222.

Health Promotion

The Office of Health Promotion reaches out to the entire campus community and encourages the adoption of healthy lifestyles, general positive attitudes, and the modification of risky health behaviors. In addition, the office selects and trains student peer educators to become healthy role models on campus, engages fellow students in peer counseling, gives presentations on health issues relevant to college students, and collects and disseminates information about current health topics to the whole community. The Health Promotion program covers topics such as alcohol and other drug issues, HIV/AIDS awareness and prevention, sexual health and responsibility, dating violence, healthy sleep lifestyles, nutrition, stress management, and tobacco cessation efforts, among other topics.

Health Fee

University policy requires that all students registered for seven or more credit hours on campus during the fall or spring semester or three or more on-campus credit hours during a summer session pay the University health fee. The health fee provides access to the professional services of University physicians, nurse practitioners, counselors, and health educators at no additional cost; reduced costs for medical diagnostics; and an after-hours urgent care excess insurance benefit. Students pay for pharmaceuticals, orthopedic equipment, specialty clinics, and psychological testing. Payment is expected at the time of service and may be made by cash, check, MasterCard, or TigerStripe.

Health Insurance—The University offers a student health insurance plan to help cover major medical expenses. Information is available at www.studentinsurance.com. Students are strongly encouraged to have comprehensive health insurance coverage during their tenure at the University.

ACADEMIC SUCCESS CENTER

The Academic Success Center (ASC) provides comprehensive academic support programs and services that enhance students' learning potential, thereby promoting academic success and personal growth. The ASC provides a nurturing environment in which students are better able to learn how to learn as well as enhance their collegiate experiences. The Center serves as a catalyst to help achieve University goals by promoting high graduation rates, promoting excellence in advising, providing support systems to all students, and increasing freshmen retention. The ASC offers the following programs and services to all students at no charge:

- Supplemental Instruction (SI) allows students enrolled in high-risk courses to work in a study group setting with peer leaders who have successfully completed the course and who have been trained to facilitate SI help sessions.
- Course specific tutoring is offered each week, Sunday through Friday, in a group setting on a walk-in basis. The ASC Tutor Request Policy allows students in need of tutoring for a course not listed in the tutoring or SI schedule to request a tutor.
- Academic Skills Workshops are held throughout the academic year to enhance the learning experience and build academic skills.
- One-on-one academic counseling sessions help students evaluate their study skills and develop strategies for academic success.
- Individual academic coaching sessions provide structure, support, and feedback to help students stay on course for success. The Academic Coach also coordinates Tiger Success, a program to help students on probation regain good academic standing at Clemson.

CAREER CENTER

The Michelin® Career Center assists undergraduate and graduate students in selecting an appropriate field of study, furthering their education, and/or learning effective job searching strategies, as well as making connections with employers.

Students can utilize a complete range of services and career development resources in the career library in both print and electronic formats. Career counselors are available to meet one-on-one with students to explore career or education options, devise résumés and cover letters, hone interviewing techniques, conduct searches for internships and full-time jobs, and ready themselves for interviewing with employers on campus. In addition, students may utilize ClemsonJobLink, the Career Center's on-line recruiting system, to view part-time jobs, internships, and full-time job positions and to sign up for on-campus interviews.

For students in majors that do not offer internship credit, the Career Center offers zero-credit-hour internships courses (CCINT). Students may participate in either a part-time or full-time internship.

Major events sponsored by the Career Center include a fall and spring Career Fair and the University Placement/Recruitment for Educators Program (UPREP) Teacher Fair.

Information is available from the Career Center at career.clemson.edu or by calling 656-6000.

DISABILITY SERVICES

Student Disability Services (SDS) coordinates the provision of reasonable accommodations for students with physical, psychological, attentional, or learning disabilities. Accommodations are individualized, flexible, and confidential based on the nature of the disability and the academic environment in compliance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990.

Students are encouraged to consult with the Student Disability Services staff as early as possible, preferably prior to the first day of classes. Current documentation of a specific disability from a licensed professional is needed. For additional information or to schedule an appointment, contact Student Disability Services at (864) 656-6848 or sds1@clemson.edu. Details on policies and procedures are available at www.clemson.edu/sds.

ACADEMIC REGULATIONS

Proper discharge of all duties is required at Clemson University, and a student's first duty is his/her scholastic work. All students should be thoroughly acquainted with these basic requirements.

CREDIT SYSTEM

The semester hour is the basis of all credits. Generally, one recitation hour or two-three laboratory hours a week for a semester constitute a semester hour. Thus, in HIST 193 Modern World History 3(3,0), as this subject is listed in the *Courses of Instruction* section of this catalog, the student takes three semester hours. When the course is completed satisfactorily, three credit hours are entered on the student's record. The notation "3(3,0)" means that the course carries three credits, has three clock hours of theory or recitation per week, and no laboratory hours. CH 101 General Chemistry 4(3,3) carries four semester hours, has three hours of theory and a three-hour laboratory period.

Credit Load

Except for an entering freshman, who is restricted to the curriculum requirements of his/her major, the credit load for an undergraduate must be approved by the academic advisor. The class advisor will approve a credit load deemed in the best interest of the student based on such factors as course requirements, grade-point ratio, participation in other activities, and expected date of graduation.

For fall and spring semesters, the maximum number of hours in which a student may enroll is 21, and 16 hours is the maximum credit load for those on probation. Permission of the student's academic advisor is required for all registration in more than 21 hours, or 16 hours for those on probation. Enrollment in summer is limited to three credit hours in Maymester, seven credit hours in first summer session, and seven credit hours in second summer session. Enrollment in additional credit hours must be approved by the student's academic advisor.

Students are not permitted to enroll in courses with overlapping class times.

Full-Time Enrollment

In fall and spring semesters, enrollment in 12 or more credit hours is considered full time. Combined enrollment in 12 or more hours in Maymester and first and second summer terms is considered full time for the summer. Enrollment in fewer than 12 credit hours is part time.

Advanced Placement and Credit by Examination

In addition to earning credit by the usual method involving classroom attendance, a student may receive credit toward his/her degree by completing a course successfully by examination only. Freshmen interested in exempting some elementary courses in this manner should participate in the College Board Advanced Placement or International Baccalaureate program and have the results of these tests sent to Clemson.

Certain departments will also grant credit for successful completion of College-Level Examination Program (CLEP) subject examinations, which are administered by the College Board.

Enrolled students may earn credit by means of a special examination without the necessity of class attendance subject to the following requirements:

1. The applicant must present evidence that he/she has received training or taken work which is approximately equivalent to that given in the course at Clemson for which an examination is requested.
2. The applicant must not have previously failed or audited the course at Clemson.
3. The applicant must apply in writing for the examination; the request must be approved by the instructor, chair of the department in which the course is taught, and the Enrolled Student Services Office. Application forms are available in the Enrolled Student Services Office, 104 Sikes Hall.

Credit (CR) will be awarded for acceptable work in lieu of letter grades in recognition of college-level achievement as determined by College Board Advanced Placement Examination, International Baccalaureate Program, College-Level Examination Program subject examination, institutional special examinations, and similar instruments.

Transfer Credit

For Clemson students, coursework completed with a grade of C or better at other regionally accredited institutions, including correspondence courses, telecourses, on-line courses, and exempted courses, will be evaluated for transfer in terms of equivalent courses included in the Clemson curriculum of the student's choice. This does not guarantee that all courses taken at other institutions will be accepted for transfer. The acceptability of each course or exemption will be based on an evaluation by the Office of Admissions. Students should obtain approval from the academic advisor for a course prior to enrolling in the course. By obtaining advance approval, the student is assured of receiving proper credit at Clemson upon satisfactory completion of the course. Information and forms relative to this approval may be obtained in the Enrolled Student Services Office, 104 Sikes Hall. Coursework earned at different institutions will not be joined to equate with one Clemson course. No course taken at a nonbaccalaureate-degree granting institution may be used as an equivalent or substitute for any 300- or 400-level Clemson course. Relative to continuing enrollment, graduation, and transcripts, only grades earned at Clemson are used in computing the student's grade-point ratio. Grades earned in qualifying (i.e., non-remedial) transfer courses will be used in calculating the student's grade-point average for South Carolina LIFE Scholarship awards. Non-remedial college classes completed while in high school are included in this calculation.

Learning experiences including, but not limited to, military service schools, non-collegiate sponsored instruction, work-related experiences, etc., will not be evaluated for transfer; however, enrolled students may request credit by examination for any non-transferable learning experience. For additional information, see *Advanced Placement and Credit by Examination* above.

Learning Experiences

All "for credit" learning experiences conducted with organizations other than accredited higher education institutions must be regularly supervised by appropriate members of the Clemson University faculty or staff. The student must be enrolled at the time the credit is generated, and the level of credit (grade) is the responsibility of the faculty member(s) in the discipline from which the grade originates.

External Education Experiences

In all "for credit" external educational programs that Clemson University may have with professional, vocational, technical, clinical, and foreign study, the agreements are to be agreed to through signature of the provost and the president. In such cases, learning experiences for which credit is awarded must be under the ultimate control and supervision of Clemson University.

GRADING SYSTEM

The grading system is as follows:

A-Excellent indicates work of a very high character, the highest grade given.

B-Good indicates work that is definitely above average, though not of the highest quality.

C-Fair indicates work of average or medium character.

D-Pass indicates work below average and unsatisfactory, the lowest passing grade.

F-Failed indicates that the student knows so little of the subject that it must be repeated in order that credit can be received.

I-Incomplete indicates that a relatively small part of the semester's work remains undone. Grade I is not given a student who made a grade F on his/her daily work. The incomplete grade is calculated as an F in the student's grade-point ratio until the work is made up and a final grade is assigned. Students are allowed thirty days after the beginning of the next scheduled session, excluding summers and regardless of the student's enrollment status, to remove the incomplete grade. Normally, only one extension for each I may be granted, and this under unusual circumstances. The extension must be approved in writing by the instructor of the course and the chair of the department in which the course was taken. The extension will indicate the nature and amount of work to be completed and the time limit. (Students under this policy are prohibited from removing the I by repeating the course.) A letter grade of I converts to F unless the incomplete is removed within the time specified.

W-Withdrew indicates that the student withdrew from the course or was withdrawn by the instructor after the first two weeks of classwork and prior to the last five weeks of classes, not including the examination period. Proportionate time periods apply during summer and other shortened sessions. Each undergraduate student is allowed to withdraw or be withdrawn with a grade of W from no more than 17 hours of coursework during the entire academic career at Clemson University. Transfer students may withdraw from no more than a total of 14 hours of coursework. Partial credit for courses cannot be dropped. A student who exceeds these limits of hours or who is enrolled during any part

of the last five weeks of classes shall have final grades recorded. A student may withdraw from the University subject to the restrictions above. Additionally, pending approval from the provost or the provost's designee, students may withdraw from Clemson University one time only during their academic careers prior to the final five weeks of classes (proportionate time periods apply during summer and other shortened sessions), without reduction from their allotted W' hours. Any variance from these restrictions must be approved by the provost or the provost's designee. The student must document the circumstances supporting the request. For financial aid purposes, enrollment is defined and satisfactory academic progress levels are established as of the last day to register or add classes. Withdrawal can negatively impact financial aid eligibility if a student does not complete a sufficient number of hours. Details are available in the publication *Financing Your Clemson University Education* or at www.clemson.edu/finaid.

Grade-Point Ratio

In calculating a student's grade-point ratio, the total number of grade points accumulated by the student is divided by the total number of credit hours attempted at Clemson during the semester, session, or other period for which the grade-point ratio is calculated. For each credit hour, the student receives grade points as follows: A-4, B-3, C-2, D-1. No grade points are assigned for grades F, I, P, or W.

Pass/Fail Option

Juniors or Seniors enrolled in four-year curricula may take four courses (maximum of 15 credit hours), with not more than two courses in a given semester, on a Pass/Fail basis. Transfer and five-year program students may take Pass/Fail courses on a pro rata basis. Only courses to be used as electives may be taken optionally as Pass/Fail.

Letter-graded courses which have been failed may not be repeated Pass/Fail.

Registration in Pass/Fail courses will be handled in the same manner as letter-graded courses. Departmental approval must be obtained via approval form and returned to the Registrar's Office by the last day to register or add a class, as stipulated in the Academic Calendar. Instructors will submit letter grades to the Registration Services Office. These grades will be converted as follows: A, B, C to P (pass); D, F to F (fail). Only P (minimum letter grade of C) or F will be shown on a student's permanent record and will not affect the grade-point ratio.

If a student changes to a major that requires a previously passed course and this course has been taken Pass/Fail, he/she may request either to take the course on a letter-graded basis, that the P be changed to C, or that another course be substituted.

In the event limited enrollment in a class is necessary, priority will be given as follows: majors, letter-graded students, Pass/Fail students, auditors.

Dropping Classwork

A subject dropped after the first two weeks of classwork and prior to the last five weeks during the fall and spring semesters is recorded as W—Withdrawn. Proportionate time periods apply during summer sessions.

Mid-Term Evaluation

Once, near mid-term, but no later than five days before the last day students can drop courses without receiving final grades, instructors of every undergraduate course shall make available for each student (a) that student's numerical course grade or (b) that student's letter ranking to date in that course (A-F or P, F). More frequent feedback is strongly encouraged.

Both student and instructor are to recognize that this feedback reflects the student's performance up to that point in time, and as such, that student's final course grade may change based upon subsequent coursework performance(s).

The policy includes all undergraduate courses and applies to all terms, including Maymester and summer sessions.

Final Examinations

The standing of a student in his/her work at the end of a semester is based upon daily classwork, tests or other work, and final examinations. Faculty members may excuse from final examinations all students having the grade of A on the coursework prior to the final examination. For all other students, examinations are required in all subjects at the end of each semester, except in courses in which final examinations are not deemed necessary as approved by the department faculty.

Final examinations must be given or due on the dates and at the times designated in the final examination schedule, except in laboratory and one-credit-hour courses where the final exam will be given at the last class meeting.

Grade Reports

Students may access their end-of-term grades on-line. Final grade reports are mailed to undergraduate students on academic probation and to other students upon request. Request forms are available in the Registration Services Office.

Academic Eligibility Policy

All students are expected to study and perform to the best of their abilities. The academic eligibility standards listed below represent minimum levels to remain enrolled at the University. Students failing to meet these standards are not making satisfactory degree progress and should seek additional assistance from their academic advisor, the Academic Success Center, or other appropriate University resources.

Academic Eligibility

Eligibility for continued enrollment is evaluated at the end of the spring semester unless otherwise indicated. Students who fail to maintain minimum standards as set forth below are subject to academic suspension or dismissal.

Academic Alert

Students who earn a semester grade-point ratio below 1.5, regardless of their cumulative grade-point ratio, will be placed on academic alert. No notation concerning academic alert will appear on the student's permanent record.

Academic Probation

Students who fail to maintain a cumulative grade-point ratio of 2.0 or higher will be placed on academic probation. No notation concerning probation will appear on the student's permanent record.

Academic Suspension

A student on academic probation (cumulative grade-point ratio below 2.0) is subject to suspension at the end of the spring semester if he/she does not meet one of the academic eligibility criteria listed below. Students entering Clemson University for the first time will not be subject to suspension until they have attempted coursework at Clemson for two semesters, excluding summer terms. Suspended students are ineligible to enroll in classes for the regular academic semester (fall or spring) immediately following the decision to suspend. Suspension is for one semester only, and the student is eligible for readmission the following term.

Academic Eligibility Criteria

Students have three options to avoid suspension or dismissal:

1. To pass at least 12 credit hours and earn a 2.4 or higher grade-point ratio in the immediately subsequent term (fall or spring). Duplicate credits do not count as credits passed unless otherwise required to meet an alternative departmental standard.
2. To achieve the minimum cumulative grade-point ratio (MCGPR) listed below.

Total Credit Hour Level	MCGPR
16-29	1.75
30-59	1.85
60-89	1.95
90+	2.00

Total Credit Hour Level includes all credit hours attempted at Clemson, plus any advanced standing received from transfer credits and credits based on approved examination programs. Only grade points earned at Clemson are used to calculate the MCGPR.

3. To enroll in summer school and pass at least 12 credit hours and earn a 2.4 or higher grade-point ratio in Maymester, first, and/or second summer sessions. Duplicate credits do not count as credits passed unless otherwise required to meet an alternative departmental standard.

In the event a student subject to suspension or dismissal is unable to achieve one of the above outcomes as a result of extenuating circumstances, the student may appeal to the Appeals Committee on Academic Eligibility at the end of the fall, spring, or second summer session.

Academic Dismissal

A student reenrolling after a suspension is subject to dismissal at the end of the semester (fall or spring) in which he/she did not meet one of the academic eligibility criteria listed above. The period of dismissal is for one calendar year and readmission is by appeal only. The student may file an appeal for readmission with the Appeals Committee on Academic Eligibility. If this appeal is denied, the student may file subsequent appeals for readmission after any intervening term. Dismissed students who are readmitted and again fail to meet the requirements for academic eligibility will be permanently dismissed.

Permanent dismissal may not be appealed, and students permanently dismissed may not apply for academic renewal.

Appealing Suspension or Dismissal

The Appeals Committee on Academic Eligibility meets approximately one week after final examinations in the fall, spring, and second summer session. Students should contact the Office of Undergraduate Studies for further information on the appeals process.

Appeals will be granted only in the most exceptional cases and may require the student to adhere to additional criteria in order to remain enrolled at the University. Students who return on a successful appeal will be reevaluated for academic eligibility at the end of each semester until a cumulative grade-point ratio of 2.0 or higher is achieved.

The evaluation for academic eligibility is separate from the evaluation for satisfactory academic progress required for Student Financial Aid. Further information on satisfactory academic progress for financial aid purposes is available in the Financial Information section of this catalog and in the publication *Financing Your Clemson University Education*.

Grade Protests

A student wishing to protest a final course grade must first try to resolve any disagreement with the instructor. If unable to reach a resolution, the student may follow the procedures listed under *Academic Grievance Board*. Grievances must be filed within 90 calendar days (exclusive of summer vacation) of the date of the last exam for the term involved.

Repeating Courses Passed

A student may repeat a course passed with a grade lower than B. If the grade is a D and the student has sufficient W hours and sufficient Academic Redemption hours, the Academic Redemption Policy below will apply. Otherwise, both grades will be calculated in the grade-point ratio. In either case, credit for the course will be counted only once toward the number of hours required for graduation. For academic eligibility purposes, duplicate credits do not count as credits passed. For financial aid purposes, duplicate credits do not count as credits completed for satisfactory academic progress. If a student repeats a course passed with a grade of B or better, the credits attempted as well as credits and grade points earned will be removed from the cumulative summary.

Repeating Courses Failed

A student who has failed a course cannot receive credit for that course until it has been satisfactorily repeated hour for hour in a class; except that in the case of co-related laboratory work, the number of hours to be taken shall be determined by the instructor. Where separate grades for class and laboratory work are given, that part of the subject shall be repeated in which the failure occurs. Successfully repeating a course previously graded F does not erase the original F grade from the student's record. If a student repeats a course in which the previous grade was F and the student has not exhausted his/her allotment of W hours or Academic Redemption hours, the Academic Redemption Policy below will apply. Otherwise, both grades appear on the record and are computed in the cumulative grade-point ratio.

Academic Redemption Policy

The Academic Redemption Policy (ARP) allows a student enrolled before August 2007 to repeat up to nine hours of coursework in which a D or F was earned if he/she has sufficient redemption and W hours remaining. Students whose initial enrollment occurs August 2007 or later may redeem up to ten credit hours. In all cases, the grade earned in the course used to redeem the earlier course will be used in computing the grade-point ratio and satisfying degree requirements. When the earlier grade is D and the second grade is F, the student cannot use the D grade to satisfy any degree requirement.

The following conditions apply:

Courses taken prior to fall semester 2003 may not be considered for academic redemption.

For students with sufficient W hours, the first ten hours of repeated coursework (nine hours for those enrolled before August 2007) will automatically be computed for academic redemption, and these hours will be deducted from the student's allotted W hours. If sufficient W hours are not available, the ARP will not apply.

Both grades will remain on the transcript, degree progress report, and other official documents. For financial aid purposes, courses repeated under this policy resulting in duplicate credit do not count for satisfactory academic progress.

If a student drops a repeated course during the period in which the Academic Calendar indicates a W grade is assigned, then both the ARP hours and W hours will be subtracted from the student's remaining ARP and W hours.

The ARP shall apply only to courses taken at Clemson University. The earlier course graded D or F can only be redeemed by repeating the same course. Course substitutions are not permitted.

Students may not invoke the ARP after they have graduated. After graduation, students may repeat coursework, but both grades will be calculated in the grade-point ratio.

The ARP may not be applied to a course taken on a Pass/Fail basis or to any course in which the student was previously found in violation of the academic integrity policy.

CLASSWORK

Academic Advising

Each student is assigned an academic advisor in his/her major area. It is the responsibility of the student to consult with his/her advisor during registration. The advisor will assist the student in scheduling courses so as to fulfill the requirements of the degree program; nevertheless, it is the responsibility of the student to fulfill the relevant requirements of the degree. For more information, visit <http://www.clemson.edu/academics/advising/>.

Course Prerequisites

Prerequisites for each course are enumerated in the *Courses of Instruction* section of this catalog. In addition to these requirements, colleges and departments may also establish other standards as conditions for

enrollment. It is the student's responsibility to refer to individual college and curricular information for specific standards.

Attendance Policy

The academic resources of Clemson University are provided for the intellectual growth and development of students. Class attendance is critical to the educational process; therefore, students should attend scheduled courses regularly if they are to attain their academic goals.

In the event of an emergency, the student should make direct contact with the course instructor, preferably before a class or an exam takes place. Students should speak with their course instructors regarding any scheduled absence as soon as possible and develop a plan for any make-up work. It is the student's responsibility to secure documentation of emergencies, if required. A student with an excessive number of absences may be withdrawn at the discretion of the course instructor.

Course instructors must implement fair grading procedures and provide an opportunity to make up missed assignments and examinations that does not unfairly penalize the student when an excused absence is accepted. Such make-up work shall be at the same level of difficulty with the missed assignment or examination. Course instructors shall hold all students with excused absences to the same standard for making up missed assignments or examinations. While course instructors should seek to make reasonable accommodation for a student involved in University-sponsored activities, students should understand that not every course can accommodate absences and that absences do not lessen the need to meet all course objectives.

Absence from class is detrimental to the learning process, so course instructors may use reasonable academic penalties which reflect the importance of work missed because of unexcused absences. Course instructors who penalize students for unexcused absences must specify attendance requirements as related to grading in the course syllabus and must keep accurate attendance records. Course instructors are obligated to honor exceptions to the university attendance policy for students covered by the Americans with Disabilities Act, as verified through paperwork issued by Student Disability Services.

Enrollment

Only students who are officially registered and have paid appropriate fees may attend classes. Students have the responsibility to insure that drop/add transactions are completed in a timely manner. Registered students who cease attending class will be assigned a failing grade.

All students are required to attend the first scheduled day of classes and labs. Students who cannot attend the first class are responsible for contacting the instructor to indicate their intent to remain in that class. If a student does not attend the first class meeting or contact the course instructor by the second meeting or the last day to add, whichever comes first, the course instructor has the option of dropping that student from the roll. Students must not assume that course instructors are obligated to drop them if they fail to attend the first few days of class.

Anticipated Absences

Students should use the Notification of Absence module in Blackboard, or other reasonable means, to notify the course instructor of a future absence from class. This communication is only for information and does not verify the student's reason for absence or impact the course instructor's evaluation of the student's academic work. The student must make personal contact with the course instructor as soon as possible.

If a student realizes in the first two weeks of classes that an anticipated number of absences will exceed the number of excused absences permitted in the course, the student should discuss the situation with the course instructor, the student's adviser, and/or the academic Associate Dean in the college in which the student is enrolled. A suitable resolution should be reached before the end of the second week of the semester.

Students are encouraged to inform course instructors of known conflicts as soon as possible, but no later than one week before the date of any assignment or exam.

Unanticipated Absences

Students should use the Notification of Absence module in Blackboard to notify the course instructor. This communication is only for information and does not verify the student's reason for absence or impact the course instructor's evaluation of the student's academic work. If the student is unable to contact course instructors, the student (or representative) should contact the Office of the Dean of Students, who will notify the course instructors of the circumstances, providing a liaison in cases limited by medical confidentiality. A student may be excused from attending class in cases of emergency or other compelling reasons deemed appropriate by the course instructor. Excuses for emergency absences must be reported to the course instructor as soon as possible (for example, through e-mail), but not more than one week after the return to class. In certain cases, the Dean of Undergraduate Studies (or designee) may provide a letter verifying the student's absence as excused. Course instructors are expected to excuse absences for reasons including:

1. Injury or illness too severe or contagious for the student to attend class, when certified by an attending physician. Physicians and staff at Redfern Health Center do not provide written excuses; however, students should retain paperwork of medical visits affirming date and time. Whenever possible, students should visit Redfern as outpatients without missing class. An absence for a non-acute medical service does not constitute an excused absence. Course instructors may, at their discretion, require documentation of medical absences.
2. Death, serious illness, or emergency in a student's immediate family (course instructors may require documentation).
3. Participation in authorized University-sponsored activities, not to include practice for the activities. Course instructors may require documentation from the course instructors or staff advisor of the sponsored University group.
4. Religious observances and practices which prevent the student from being present during a

class period (advanced consultation/approval by the instructor is necessary).

5. Participation in court-imposed legal proceedings (e.g., jury duty or subpoena).

6. Required participation in military obligations as certified by the student's commanding officer.

In the event of a regional or national emergency (e.g., pandemic, hurricane, etc.), students missing classes may not be charged with unexcused absences if the nature and extent of the emergency is defined and disseminated by the Provost (or designee).

Appeals

Any student who feels that a grade has been affected by a legitimate absence that an instructor did not excuse may appeal the grade through the Academic Grievance process. Students may appeal, in writing, a course instructor's decision not to excuse an absence to the academic Associate Dean of the academic unit offering the course. Before taking action, the Associate Dean should request that the course instructor explain his or her denial in writing.

Dead Days

During the last two class days of the fall and spring semesters, commonly referred to as *Dead Days*, all regularly scheduled classes are conducted; however, course testing on these days is limited to scheduled laboratory and one-semester-hour course final exams and make-up tests. Dead Days are observed during fall and spring semesters only. Dead Days do not apply to courses numbered 600 or above.

Auditing Policies

Qualified students may audit courses upon written approval of the instructor. Auditors are under no obligation of regular attendance, preparation, recitation, or examination and receive no credit. Participation in classroom discussion and laboratory exercises by auditors is at the discretion of the instructor. A student who has previously audited a course is ineligible for credit by examination.

Undergraduate and graduate students enrolled in 12 or more hours may audit courses at no additional charge. Others interested in auditing should verify their eligibility through the Registrar's Office.

Combined Bachelor's/Master's Plan

Students may reduce the time necessary to earn both degrees by applying graduate credits to both undergraduate and graduate program requirements. To be eligible, the student must have completed the bachelor's curriculum through the junior year (minimum 90 credits) and have a minimum overall grade-point ratio of 3.4. A maximum of 12 credit hours of graduate courses in the master's program may be applied to the bachelor's program. As determined by the participating bachelor's program, graduate courses may be applied to the bachelor's degree as electives or technical requirements or by substitution of 700- or 800-level courses for required undergraduate courses. Under no circumstances can 600-level counterparts of 400-level courses required for the bachelor's degree be counted toward master's requirements. Combined bachelor's/master's plan students are not eligible for graduate appointments for financial aid until their bachelor's degrees have been awarded.

Procedure for Students

Since neither all undergraduate nor graduate programs participate in this academic option, seniors should consult both their academic advisor and the graduate program coordinator of the master's program they wish to pursue. Students must officially request participation in the combined bachelor's/master's program by completion of Form GS6BS/MS, "Request for Combined Bachelor's/Master's Education Plan," available on-line at www.grad.clemson.edu/forms/GeneralForms.php. Endorsements by the program coordinator or department chair of both programs are required.

Procedure for Departments

Departments and graduate programs desiring to participate in the combined bachelor's/master's program should submit a written notification to the dean of the Graduate School identifying the date on which they intend to make this option available to their students.

Senior Enrollment in Graduate Courses

Clemson University seniors meeting the accepted academic standard for graduate work (3.0 cumulative grade-point ratio) are eligible to request enrollment in graduate level courses. Enrollment of seniors in any graduate course is subject to approval by the department offering the course and the Graduate School. The total course workload for the semester must not exceed 18 hours, and the cumulative graduate credits earned by seniors shall not exceed 12 semester hours. The credits and quality points associated with senior enrollment in graduate courses will be part of the undergraduate record.

Seniors with a 3.4 or Higher GPR

Seniors with 3.4 or higher grade-point ratios are eligible for participation in the combined bachelor's/master's plan (see "Combined Bachelor's/Master's Plan").

Seniors with a 3.0 or Higher GPR

Seniors with 3.0 or higher grade-point ratios are eligible to request enrollment in graduate level courses to meet requirements for the bachelor's degree; however, courses used for this purpose cannot be counted later towards an advanced degree. Alternatively, these students may also take courses in excess of the requirements for their undergraduate degrees and may request that these courses be included as a part of their graduate program if they are subsequently admitted to the Graduate School. Courses cannot be taken at the 600 level if their 400-level counterparts are required for the undergraduate degree in the same academic major as the proposed graduate degree.

Procedure for Students

Approval by the Graduate School is required prior to registration in any graduate course. Senior enrollment forms, GS6, Request for Senior Enrollment and GS6BS/MS, are available at www.grad.clemson.edu/forms/GeneralForms.php.

GRADUATION REQUIREMENTS

A candidate for an undergraduate degree is a student who has submitted a completed diploma application by the deadline prescribed in the University calendar for a particular graduation date.

Candidates for degrees are required to apply for their diplomas within three weeks following the opening of the final semester or the opening of the first summer session prior to the date the degrees are to be awarded. Applications must be submitted through SISWeb at tigerweb.clemson.edu.

Only candidates who have completed all graduation requirements are permitted to participate in the graduation ceremony.

Residence Requirement

To qualify for an undergraduate degree, a student must complete through instruction from Clemson a minimum of 37 of the last 43 credits presented for the degree. A waiver may be obtained for approved study abroad experiences through the Undergraduate Studies Office, E-103 Martin Hall. (To qualify for the five-year professional undergraduate degree in Landscape Architecture, a student must complete through instruction from Clemson, a minimum of 42 of the last 48 credits presented for the degree.)

Make-up of Incompletes Received in Last Semester

A candidate for a degree who receives one or more grades of I in the semester immediately prior to graduation shall have an opportunity to remove the unsatisfactory grades provided the final grades are received in the Registration Services Office, E-206 Martin Hall, by the time grades for candidates for graduation are due. A student who qualifies for graduation under this regulation will be awarded his/her degree on the regular date for the award of degrees.

Special Requirements

A cumulative grade-point ratio of 2.0 is required for graduation. Candidates for graduation must be officially accepted in the major in which they are applying for a degree no later than the term prior to submitting the application.

Awarding of Degrees Posthumously

An undergraduate student may be awarded a degree posthumously on the recommendation of the faculty of the college concerned, subject to the following conditions:

- the student had at least a 2.0 grade-point ratio at time of death
- including credits scheduled in the term in which death occurred, the student a) had satisfied 75% of the degree requirements and b) met the residence requirement for a degree which requires that 37 of the last 43 credits presented for a degree be earned at Clemson.

Credit Limitation

If all work toward a degree is not completed within six years after entrance, the student may be required to take additional courses.

Academic Honors

Honor Graduates

To be graduated with honors, a student must have a minimum cumulative grade-point ratio as follows: cum laude—3.70, magna cum laude—3.85, and summa cum laude—3.95.

Honor Lists

At the end of the fall and spring semesters, the following lists shall be compiled of undergraduate students who have achieved grade-point ratios of 3.50–4.00 on a minimum of 12 semester hours, exclusive of Pass/Fail coursework.

Dean's List—3.50 to 3.99 grade-point ratio

President's List—4.00 grade-point ratio

Honors and Awards

The University offers a number of awards for outstanding achievement in specific fields and endeavors. Recipients are chosen by selection committees and are announced at the annual Honors and Awards Day program or other appropriate ceremonies. Detailed information relating to such awards is available in the offices of the academic deans and department chairs.

Preprofessional Studies

Clemson University will award the degree of Bachelor of Arts or Bachelor of Science in Preprofessional Studies to a student who is pursuing a degree in a professional school. The student must have also satisfactorily completed three years of undergraduate work in an appropriate curriculum and the first year of work in an accredited medical, dental, veterinary, or other accredited professional school, provided the student fulfills the requirements for the three-year program as follows and the other specified conditions are met.

1. At least two of the three years of preprofessional work, including the third year, must be taken in residence at this University.
2. A minimum of three years of undergraduate work (i.e. preprofessional school credit) must be presented.
3. Normal progress must have been made toward fulfilling the degree requirement of the curriculum in which the student is enrolled at Clemson.
4. The student applying for the Bachelor of Arts or Bachelor of Science in Preprofessional Studies must be recommended by the college at Clemson in which the curriculum that he/she is majoring as a Clemson student is located or by the college in which three years of normal progress toward a degree can be identified.
5. If the combination of preprofessional work taken and the work in the first year of professional school is equivalent to that which is required in some other bachelor's degree program at Clemson, the college concerned may recommend the other bachelor's degree.

The above requirements and conditions became effective July 1, 1974, and will apply to all students who satisfy these requirements and conditions after that date.

A Clemson student having left the University before receiving the bachelor's degree (prior to July 1, 1974) and having enrolled immediately in an accredited professional postgraduate school may apply for a

bachelor's degree from Clemson and have his/her application considered on an individual basis. The college(s) at Clemson considering the application is authorized to examine the student's entire record in both preprofessional and professional studies and exercise its own judgment concerning the three-year requirement for Preprofessional Studies.

Second Baccalaureate Degree

To complete a second baccalaureate degree, a student must complete a minimum of 30 semester hours at Clemson in addition to the greater number of hours required for either degree and satisfy all course and grade requirements for the second degree.

Double Major

A student in a Bachelor of Arts degree program may be awarded a single baccalaureate degree with a double major. The two majors may be within a single college or may involve two colleges but are limited to Bachelor of Arts degree programs.

Graduate Degrees

Graduate degrees are available from all five colleges in addition to several interdisciplinary programs. Clemson University offers more than 100 graduate degree programs. The degrees of Doctor of Philosophy, Education Specialist, Master of Arts, Master of Science, Master of Agricultural Education, Master of Architecture, Master of Arts in Teaching, Master of Business Administration, Master of City and Regional Planning, Master of Construction Science and Management, Master of Education, Master of Engineering, Master of Fine Arts, Master of Forest Resources, Master of Human Resource Development, Master of Landscape Architecture, Master of Parks, Recreation, and Tourism Management, Master of Professional Accountancy, Master of Public Administration, and Master of Real Estate Development are awarded to students who complete prescribed graduate programs.

Additional information is available from the Graduate School.

ACADEMIC RECORDS

The student's permanent academic record is maintained in the Registrar's Office and contains personal identifying information, grades, and credits. Where appropriate, statements of a corrective nature, withdrawals, suspension for failure to meet academic standards, suspension for disciplinary reasons, and graduation data are added. The academic record is a historical record of the student's academic progress.

Classification

All new students are classified as freshmen unless they have attended another college prior to entrance. Students who have completed college work elsewhere will be classified on the basis of semester hours accepted at Clemson rather than the amount of work presented. To be classified as a member of any class other than freshman, students must meet the credit-hour requirements below:

- Sophomore—minimum 30 credit hours
- Junior—minimum 60 credit hours
- Senior—minimum 90 credit hours

Change of Major

Any undergraduate student who meets the Academic Eligibility Policy after attempting 12 credit hours at Clemson University (or who is allowed to continue by virtue of a semester 2.4 grade-point ratio on 12 earned credits or who is allowed to continue through appeal to the Appeals Committee on Academic Eligibility or by other authorization of this committee) may transfer from one major to another. Any college or department that seeks an exception to this policy must have the approval of the collegiate dean and the provost.

Withdrawal from the University

A student may withdraw from the University subject to the restrictions in the section on W-Withdraw. Students who exceed these restrictions shall have final grades recorded. Any variance from the restrictions must be approved by the provost or the provost's designee. The student must document the circumstances supporting the request. All University withdrawals (including withdrawing from the only course in which a student is enrolled) must be processed by the Associate Dean of Undergraduate Studies. Students should report to E-103 Martin Hall. Students receiving financial aid who withdraw from the University may have to repay significant portions of their financial aid. Students should report to G-08 Sikes Hall to determine the amount. For financial aid purposes, enrollment is defined and satisfactory academic progress levels are established as of the last day to register or add classes. Withdrawing from the University can negatively impact financial aid eligibility if a student has not completed a sufficient number of hours. Details are available in the publication *Financing Your Clemson University Education* or at www.clemson.edu/finaid.

Academic Renewal

The student who has not enrolled at Clemson for a period of two or more academic years may apply to the Appeals Committee on Academic Eligibility for readmission under special conditions known as academic renewal, unless the student has been permanently dismissed. Under the academic renewal conditions, the previous credits attempted and grade-point deficit will not constitute a liability in a new grade-point computation; however, no credits passed or their attending grade points will be available to the student for a degree at Clemson, and any courses previously passed may not be validated by special examination. The previous record will appear on the permanent record as well as the notation of readmission under the policy of academic renewal. Students returning under the academic renewal policy who apply for financial aid should submit written notification of their status to the Office of Student Financial Aid in order to update their academic progress record. For financial aid purposes, terms enrolled in prior to academic renewal are counted in the 12 semesters allowed for satisfactory academic progress.

Transcripts

Official transcripts are issued only at the authorized, written request of the student. Requests should be directed to Transcripts, 104 Sikes Hall, Box 345125, Clemson, SC 29634-5125. Transcript Request forms may be downloaded at registrar.clemson.edu/html/transcript.htm. Payment in advance is required and

may be made by Discover, MasterCard, American Express, VISA, TigerStripe, check (payable to Clemson University), money order or cash. The following must be included with the transcript request: full name (including any names used while at Clemson), social security number, current address, date of birth, date the student last attended Clemson, where the transcript is to be sent, student signature, and payment of \$10 per transcript. Telephone requests will not be honored. Transcript requests are normally processed within 48 hours, but additional processing time may be required at the end of a semester. Information is available from the Enrolled Student Services Office at the address above or by telephone at (864) 656-2173. Official transcripts are not issued for those who are indebted to the University.

UNDERGRADUATE ACADEMIC INTEGRITY

As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a "high seminary of learning." Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form.

I. Academic Integrity Policy

A. Any breach of the principles outlined in the Academic Integrity Statement is considered an act of academic dishonesty.

B. Academic dishonesty is further defined as:

1. Giving, receiving, or using unauthorized aid on any academic work;
2. Plagiarism, which includes the intentional or unintentional copying of language, structure, or ideas of another and attributing the work to one's own efforts;
3. Attempts to copy, edit, or delete computer files that belong to another person or use of computer accounts that belong to another person without the permission of the file owner or account owner;

C. All academic work submitted for grading contains an implicit pledge and may contain, at the request of an instructor, an explicit pledge by the student that no unauthorized aid has been received.

D. It is the responsibility of every member of the Clemson University community to enforce the Academic Integrity Policy.

II. Academic Integrity Committee

The power to hear cases of academic dishonesty is vested in an Academic Integrity Committee.

A. Structure—The Academic Integrity Committee is composed of twenty members as follows:

1. Ten tenured members of the faculty; two members from each college elected by their respective collegiate faculties. Faculty members will be elected on a staggered term basis, serving for a period of two years after initiation of staggered terms. Terms commence with fall semester late registration.
2. Ten members of the undergraduate student body; two from each college. Student members are

nominated by the Student Body President through an application and interview process in the spring semester, approved by the Student Senate, and appointed by the provost for terms of two years. Students must have a 3.0 grade point ratio at the time of appointment and must have completed 30 hours by the end of the spring semester. Nominations will be made in the spring semester with terms of service commencing with fall semester late registration.

3. The committee is divided into four standing boards, hereafter referred to as hearing boards, which will hear the cases of academic dishonesty. Hearing boards convene on a weekly, rotational basis unless there are no cases to be heard. For summer sessions, the Associate Dean of Undergraduate Studies must maintain at least one hearing board to hear cases.

4. Hearing boards are composed of two faculty members, two students, and one chairperson. Quorum, for a hearing board, is one student, one faculty member, and a chairperson. Decisions by the hearing board will be by majority vote.

5. Chairpersons will be elected from within the Committee's membership. Two chairpersons are selected from the faculty membership and two from the student membership.

6. Before hearing any cases, a new member of the committee must undergo a training session(s) with the Associate Dean of Undergraduate Studies.

7. The Associate Dean of Undergraduate Studies is the administrative coordinator of the Academic Integrity Committee.

B. Procedures

1. When, in the opinion of a course instructor, there is evidence that a student has committed an act of academic dishonesty, that person must make a formal written charge of academic dishonesty, including a description of the misconduct, to the Associate Dean of Undergraduate Studies. The reporting person may, at his/her discretion, inform each involved student privately of the nature of the alleged charge. In cases of plagiarism (I.B.2.) instructors may use, as an option, the Plagiarism Resolution Form available from the Office of Undergraduate Studies.

2. When, in the opinion of a student, there is evidence that another student has committed an act of academic dishonesty, he/she should contact the instructor for the course to discuss the incident. After being contacted, if, in the opinion of the instructor, there is evidence that a student has committed an act of academic dishonesty, the instructor must make a formal written charge of academic dishonesty, including a description of the misconduct, to the Associate Dean of Undergraduate Studies. The instructor may, at his/her discretion, inform each student involved privately of the nature of the alleged charge.

3. If, for any reason, the person who first discovered an integrity violation is not available to present a charge, the department chair (or designee) or college Associate Dean for the department in which the course is taught may submit the charge to the Associate Dean of Undergraduate Studies.

4. When the Associate Dean of Undergraduate Studies has received a formal charge of an alleged violation, he/she will contact the student involved privately to notify him/her of the charge and will provide the student with a copy of the charge and a copy of the procedures that the Academic Integrity Committee has adopted, pursuant to number 7 below. If a student is charged with academic dishonesty

he/she may not withdraw from the course unless he/she is exonerated of the charge. If a student is found in violation of the academic integrity policy and receives a redeemable grade as the penalty, he/she will not be allowed to redeem that grade under the Academic Redemption Policy. If the student fails to respond to the Associate Dean's requests for a meeting within ten university working days, the student is considered to have waived his/her right to a hearing, thus admitting to being in violation of the Academic Integrity Policy.

5. After informing the student involved, the Associate Dean of Undergraduate Studies will convene one of the boards of the Academic Integrity Committee within 14 calendar days (exclusive of University holidays) from the date the accused student provides a written rebuttal to the charge. The student will provide the rebuttal no later than five university working days following notification of the charge from Undergraduate Studies. (Students charged in the spring term, but not enrolled in summer sessions, may be given a continuance to the next fall term. Should the University schedule be interrupted due to emergency circumstances, academic integrity cases will be resolved as soon as possible once classes resume.) All students will be presumed not in violation of a charge until found in violation by a hearing board. Each party is responsible for having present at the hearing all witnesses that he/she wishes to speak on his/her behalf. Witnesses must have first-hand knowledge of the events under discussion.

6. A charge of academic dishonesty in a course must be made within thirty days after the beginning of the next term, exclusive of summer vacation. For cases that are not resolved before course grades are due, instructors will assign a grade of * as a placeholder for the grade. This symbol will be replaced with the course grade once the case is resolved.

7. The Academic Integrity Committee will adopt its procedures, to be followed by all hearing boards, prior to the first case heard by a hearing board. In addition to providing the student with a copy of the procedures, as stated in number 4 above, the Associate Dean of Undergraduate Studies will provide a copy of the procedures to the involved course instructor and also the hearing board members. The Associate Dean of Undergraduate Studies will also retain copies of these procedures. The procedures must afford both instructors and students the opportunity to present their cases and the opportunity for rebuttal.

8. In cases in which there is a finding of "in violation," the course instructor may consult with the Associate Dean of Undergraduate Studies to consider any past precedent established regarding academic penalties levied in similar cases. Instructors must inform the Associate Dean of Undergraduate Studies of the academic penalty for a student found "in violation" by a hearing board.

9. The Associate Dean of Undergraduate Studies is responsible for notifying the registrar and all other appropriate University personnel of the finding of "in violation" and the academic penalty. The Associate Dean of Undergraduate Studies retains all records of academic dishonesty cases and their findings in accordance with the University's Records Retention Policy.

C. Penalties

1. Upon a finding of "not in violation" by a hearing board, the student's record will not reflect the incident.

2. Upon a finding of "in violation" by a hearing board, the Associate Dean of Undergraduate Studies will notify the student and course instructor of the decision immediately. If the offense is the first for the student, then the instructor has the ability to determine the academic penalty, which shall not exceed a grade of F for the course.

3. If the finding of "in violation" is not the student's first offense, the student will receive a grade of F for the course, will be suspended from the University for one or more semesters, and may be permanently dismissed from the University. The hearing board will determine the period for which the student will be suspended or, if applicable, permanently dismissed. If the accused student waives his/her right to a hearing and the incident is not a first offense, the student will receive a grade of F for the course and will be suspended from the University for one or more semesters. The length of the suspension will be determined by the Associate Dean of Undergraduate Studies. Suspension or dismissal requires the approval of the President of the University.

D. Appeals

1. Students do not have the option to appeal a decision rendered by the hearing board, whether it is the first, second, or any subsequent offense. Students do not have the option to appeal the penalty determined by the course instructor for first offenses or to appeal the grade of F for the course given for second offenses.

2. For offenses resulting in suspension or permanent dismissal, students have the option to present written information to the Dean of Undergraduate Studies to appeal the length of the suspension or to appeal a decision of permanent dismissal. Students must present information in their defense, as allowed in this paragraph, to the Dean within five university working days after receipt of written notification of the suspension or dismissal. However, as stated in number 1 above, students cannot appeal a decision rendered by the hearing board.

ACADEMIC GRIEVANCE BOARD

I. Purpose

Clemson University is dedicated to the fair and impartial review of grievances by students against faculty and staff. The Academic Grievance Board is responsible for reviewing and adjudicating allegations by undergraduate students of unfairness or inequity in the assigning of final grades. Only grievances that contest a final grade are considered by the Academic Grievance Board.

II. Definitions

The Academic Grievance Board comprises two separate entities: a seven-person Academic Grievance Panel and a 25-person Academic Grievance Committee.

The Academic Grievance Panel is responsible for the initial review of grievances and for determining which grievances will go forward to the Academic Grievance Committee (see section IV.4 below). There are five faculty representatives to the Academic Grievance Panel, one from each of the five colleges. The members of the Academic Grievance Panel are appointed by the Dean of Undergraduate Studies for three-year terms. In addition, there are two

undergraduate student representatives to the panel appointed for two-year terms. Undergraduate student representatives are selected on a rotating basis from each of the five colleges. The student representatives are appointed to the Academic Grievance Panel by the President of the Student Senate. The Academic Grievance Panel will elect a chair each year, chosen from among the faculty members on the Academic Grievance Panel.

The Academic Grievance Committee is responsible for hearing student grievances, proposing resolutions to grievances, and, in the case of appeals, forwarding recommendations to the Dean of Undergraduate Studies. Grievances are heard by three-person subcommittees, appointed by the Chair of the Academic Grievance Committee. The Academic Grievance Committee may hear a grievance only if a recommendation for a hearing is made by the Academic Grievance Panel. The Academic Grievance Committee consists of 15 faculty representatives, three from each college, and ten student representatives, two from each college. Faculty representatives are elected by their colleges and serve three-year terms. Student representatives are appointed by the President of the Student Senate and serve two-year terms. The Chair of the Academic Grievance Committee is appointed by the Dean of Undergraduate Studies.

III. Grounds for Academic Grievances

The Academic Grievance Board provides for hearings on academic grievances that are based on either or both of the following claims:

A. The method used for arriving at a student's final grade was in clear violation of the method described in the instructor's course syllabus.

B. The method used for arriving at a student's final grade was in clear violation of departmental, college or university policy.

The Academic Grievance Board will not attempt to substitute its judgment for an instructor's on such matters as a) quality of the instructor's teaching, b) quality of the student's work, or c) quality of course content.

The Academic Grievance Committee shall not hear any grievances including allegations of discrimination based on age, color, disability, gender, national origin, race, religion, sexual orientation, or veteran's status even if the grievance falls within one of the categories noted above. All such discrimination complaints should be submitted to the Office of Access and Equity in 110 Holtendorff, 656-3181. The Academic Grievance Committee shall refer any such discrimination complaints it receives to the Office of Access and Equity.

IV. Rules and Procedures for Academic Grievances

1. Any student filing a grievance must first attempt to resolve it by consulting with the involved faculty member. In the event that the student and faculty member cannot arrive at a resolution, the student shall consult with the department chair of the faculty member and the Dean of the college of the faculty member, respectively. The department chair and Dean shall make every effort to help the student and the faculty member arrive at a resolution to the problem. At any time during this process, the student may consult with the Undergraduate Student Ombudsman.

2. If the grievance remains unresolved, the student may bring the grievance before the Academic Grievance Board. The student must first meet with the Associate Dean in the Office of Undergraduate Studies. The Associate Dean will describe the grievance process to the student. If the student wishes to proceed with the grievance, the student will provide a written statement detailing the grievance to the Associate Dean. The written statement must specify the specific syllabus, departmental, college or university policy that the student alleges to have been violated. In addition, the student will secure, from the Office of Undergraduate Studies, a grievance checklist form. On this form, identified by complaint number, the student will document the following: (a) the dates of those consultations described in procedure IV.1 above, (b) the names of those persons consulted, and (c) the signature of the collegiate Dean attesting that no resolution could be reached. The completed checklist form will then be returned to the Associate Dean for signature. Both the written statement and the completed checklist form must be delivered to the Office of Undergraduate Studies within 90 calendar days (exclusive of summer vacation) of the date of the last exam for the term in which the student alleges to have been aggrieved. The failure of a student to file a grievance within the 90-day period will cause him/her to forfeit his/her right to file a grievance under this procedure.

3. When all procedures described in item IV.2 have been completed, the Office of Undergraduate Studies will forward a copy of the grievance to the chair of the Academic Grievance Panel. The chair of the Academic Grievance Panel shall, upon receipt of the grievance, convene the Academic Grievance Panel to review the grievance. The Office of Undergraduate Studies shall retain the original documents.

4. The Academic Grievance Panel will review the grievance and ascertain whether the complaint meets the criteria for "Grounds for Academic Grievances" (III above). The Academic Grievance Panel will handle each case in a confidential manner.

5. Following the complaint review, the Academic Grievance Panel will (a) make a written recommendation to the Associate Dean to dismiss the grievance, with the grievance identified by complaint number, or (b) make a written recommendation to the Academic Grievance Committee to hear the grievance and arrive at a recommendation. In the case that the Academic Grievance Panel recommends that the grievance be heard by the Academic Grievance Committee, a copy of the recommendation, identified by complaint number, will be forwarded to the Office of Undergraduate Studies.

6. If the Academic Grievance Panel recommends dismissal of the case, the Associate Dean will notify the student, the involved faculty member, the department chair of the involved faculty member, and the involved collegiate Dean.

7. If the Academic Grievance Panel recommends a hearing, the Chair of the Academic Grievance Committee shall, upon receipt of the recommendation from the Academic Grievance Panel and all relevant documents, appoint a three-person subcommittee to hold a hearing on the grievance. The subcommittee will be selected from among the members of the Academic Grievance Committee. The subcommittee will consist of a faculty member assigned to serve as the subcommittee chairperson, another faculty member,

and a student representative to the subcommittee. The Chair of the Academic Grievance Committee may serve as one of the two faculty representatives to the subcommittee. If possible, the subcommittee shall include members who are not in the same college as the grievant or the faculty member against whom the grievance has been filed.

8. Prior to chairing a hearing (see item 9 below) the chairperson of the subcommittee will contact the student who has filed the grievance as well as the faculty member against whom the grievance has been filed. The chairperson of the subcommittee will provide copies of the grievance to both parties, answer any procedural questions that the parties have, and also ask each party if they have anything to add to the written record prior to the hearing. If additional written materials are submitted prior to the hearing, the chairperson of the subcommittee will distribute copies to all subcommittee members and to all parties to the grievance. The chairperson of the subcommittee will, to the extent possible, handle each case in a confidential manner.

9. The hearing on the grievance will be informal and shall be closed to the public. The chairperson shall take whatever action is necessary to ensure an equitable, orderly and expeditious hearing. All parties to the grievance shall be given an opportunity to be heard. In addition, the chairperson may request the presence of any other person who can supply information pertinent to the grievance. Witnesses shall not be present during the hearing proceedings except when they are called to speak before the committee. The parties shall be permitted to question all individuals who are heard by the committee. If any witness is unable to be present at the hearing, the chairperson may, at his/her discretion, accept a written statement from that witness to be presented at the hearing. The parties shall be accorded the right to assistance of counsel of their own choice; however, counsel shall not be permitted to participate actively in the proceedings.

10. Upon conclusion of the hearing, the subcommittee shall reach, by majority vote, a posed solution to the grievance. The subcommittee chairperson shall then formulate the findings in writing and seek to obtain from the parties involved in the grievance signed acceptance of the recommended solution to the grievance. If all parties to the grievance accept the solution posed by the subcommittee, the matter of the grievance will be considered closed when the solution has been implemented. Copies of the written findings and recommended solution will be forwarded by the subcommittee chairperson to both parties to the grievance for acceptance via return receipted certified mail. Each party will be asked to indicate acceptance of the posed solution by signing and returning the letter within 14 calendar days of its date. Failure to respond within 14 calendar days will constitute acceptance. Proper notification of the solution arrived at by the subcommittee will then be mailed by the subcommittee chairperson to the involved faculty member, the department chair of the faculty member, the involved collegiate Dean, the Chair of the Academic Grievance Committee, and the Associate Dean of Undergraduate Studies. In the event that both parties agree to a change in grade, the Chair of the Academic Grievance Committee will also notify the Office of Records and Registration of the decision.

11. If, after the conclusion of the hearing on the grievance, the chairperson cannot secure acceptance of the posed solution, the grievance shall be referred by the subcommittee chairperson, to the Dean of Undergraduate Studies. The subcommittee chairperson shall submit the subcommittee's recommended solution to the grievance along with all supporting evidence previously submitted to the subcommittee. When grievances are referred in this manner, the Dean of Undergraduate Studies, on behalf of the University, shall make the final decision on the solution to the grievance and will then notify the student, the involved faculty member, the department chair of the involved faculty member, the involved collegiate Dean, the Chair of the Academic Grievance Committee and the Associate Dean of Undergraduate Studies of the University's final decision. In the event that the Dean of Undergraduate Studies decides in favor of a change in grade, the Dean of Undergraduate Studies will also notify the Office of Records and Registration of the University's decision.

12. To the extent permitted by law, the Associate Dean of Undergraduate Studies shall keep in confidence all records pertinent to grievances. Records shall be available to succeeding chairpersons of the Academic Grievance Committee.

13. The Academic Grievance Committee shall make every reasonable effort to resolve each grievance by the end of the semester that follows the semester in which the student received the grade that is being contested (summers not included).

14. These procedures can be changed by the Academic Council. Such changes shall not affect any case under consideration at the time of the change. Notification of any changes to the procedure shall be given to the Dean of Undergraduate Studies of the University via the Academic Council.

ACADEMIC MISCONDUCT FOR FORMER STUDENTS

It is possible that an act of academic misconduct will remain undiscovered until after a degree is awarded. In such a case, Clemson University reserves the right to revoke any degree based on new revelations about scholarly issues including, but not restricted to, admissions credentials, all forms of coursework, research, theses, dissertations, or other final products.

I. Submission of Fraudulent Admissions Credentials

The submission of fraudulent admissions credentials in the student's application or any other document submitted for admission to Clemson University shall result in initiation of action under the Procedure on Revocation of Academic Degrees.

II. Academic Dishonesty in Coursework

A. In the event that the act is alleged to have occurred within the context of a course and is consistent with the general definition of academic dishonesty presented in Sections I of the Academic Integrity Policy, the same procedures in that policy will apply for academic misconduct listed in III B 1 a.

B. Graduate Students—If the resulting penalty is either the assignment of a grade of D or F on a required graduate course, or the issuance of any other

that causes the student not to possess a cumulative B average in both graduate courses and in all courses, action under the Policy and Procedures on Revocation of Academic Degrees may be initiated.

C. Undergraduate Students—If the resulting penalty causes the student to no longer have the necessary credit hours, coursework, or grade average for receiving a degree, action under the Policy and Procedures on Revocation of Academic Degrees may be initiated.

III. Falsification of Data and Plagiarism in Theses, Dissertations, or Other Final Projects

Data falsification, plagiarism (as defined in the Academic Integrity Policy) and other acts of academic dishonesty in a thesis, dissertation, or other final project are serious acts of misconduct. Allegations of this type of misconduct may result in initiation of action under the Policy and Procedure on Revocation of Academic Degrees.

REVOCATION OF ACADEMIC DEGREES

Preamble

Academic institutions have a critical responsibility to provide an environment that promotes integrity, while at the same time encouraging openness and creativity among scholars. Care must be taken to ensure that honest error and ambiguities of interpretation of scholarly activities are distinguishable from outright misconduct. This policy is applicable to fraudulent or other misconduct in obtaining an academic degree which is so egregious that a mechanism for revoking an academic degree, either graduate or undergraduate, must be undertaken. The Clemson University Board of Trustees has the sole authority to revoke any degree previously awarded.

Definitions

As used herein, the following terms shall apply:

A. When the degree holder was an undergraduate student:

1. "Dean" shall mean the Dean of the academic college where student was enrolled.

2. "Committee of Investigation and Recommendation" shall be composed of the members of the standing University Undergraduate Academic Eligibility Appeals Committee. An undergraduate student will be appointed to the Committee of Investigation and Recommendation by the President of the Student Body within ten (10) calendar days of notification by the President of the Faculty Senate. Any member of the Academic Eligibility Appeals Committee who is a faculty member in the department which awarded the degree involved shall not be a member of the Committee of Investigation and Recommendation for that particular investigation. If there are fewer than three (3) non-disqualified faculty members, the President of the Faculty Senate shall appoint additional faculty members to bring the number of faculty committee members up to three (3). If the President of the Faculty Senate is from the same department that awarded the degree involved, the President-Elect of the Faculty Senate shall appoint the additional member.

B. When the degree holder was a graduate student:

1. "Dean" shall mean the Dean of the Graduate School.

2. "Committee of Investigation and Recommendation" shall be composed of the members of the standing University Graduate Admissions and Continuing Enrollment Appeals Committee, except for the Associate Dean of the Graduate School who shall not be a member of the Committee of Investigation and Recommendation. A graduate student will be appointed to the Committee of Investigations and Recommendation by the President of Graduate Student Government within ten (10) calendar days of notification by the President of the Faculty Senate. Any member of the Graduate Admissions and Continuing Enrollment Appeals Committee who is a faculty member in the department which awarded the degree involved shall not be a member of the Committee of Investigation and Recommendation for that particular investigation. If there are fewer than three (3) non-disqualified faculty members, the President of the Faculty Senate shall appoint additional faculty members to bring the number of faculty committee members up to three (3). If the President of the Faculty Senate is from the same department that awarded the degree involved, the President-Elect of the Faculty Senate shall appoint the additional member.

Complaint

An allegation or complaint involving the possibility of misconduct can be raised by anyone. The allegation should be made in writing to the Dean.

Initial Review

The Dean will conduct the initial review to determine whether or not the allegation has merit. The Dean may discuss the matter with the former student's advisory committee (if any) and other faculty as appropriate. The Dean may also contact persons outside the University who may be able to provide factual information on the alleged misconduct or who may otherwise have expertise concerning issues involved in the alleged misconduct. If the Dean determines that the allegation has no merit, he/she will terminate the investigation. If the Dean determines that serious academic misconduct is suspected, the Dean will notify the President of the Faculty Senate in writing in a confidential manner. The Dean shall also notify the Vice President for Academic Affairs and Provost of the charge but will not discuss any details of the charge.

Committee of Inquiry

The President of the Faculty Senate shall, within (10) calendar days of receipt of the notification from the Dean, appoint three (3) faculty members to the Committee of Inquiry and notify the President of Graduate Student Government or the President of the Student Body, as appropriate, who shall appoint a graduate or undergraduate student, as appropriate, to the Committee of Inquiry within ten (10) calendar days of notification. The President of the Faculty Senate shall also notify the degree holder of the formation of a Committee of Inquiry.

If the Faculty Senate President is from the same department that awarded the degree involved, the President-Elect of the Faculty Senate shall appoint the Committee of Inquiry. The faculty members will be appointed from departments which did not

award the degree involved. The Committee will elect its chairman from the faculty members on the Committee.

For each allegation, the Committee of Inquiry will review the complaint and any other information provided by the Dean and determine whether there is sufficient evidence to warrant a formal charge of academic misconduct and further investigation under this policy. While the Committee of Inquiry shall not make a recommendation as to whether a degree should be revoked, the purpose is to provide a review to separate frivolous, unjustified or mistaken allegations from those requiring a more detailed and formal investigation. The Committee of Inquiry will review the evidence and must determine that the alleged misconduct more probably than not occurred in order for the committee to recommend a formal charge and further investigation.

Within thirty (30) calendar days of the formation of the Committee of Inquiry, the Committee of Inquiry will submit a written report to the President of the Faculty Senate. If the Committee of Inquiry's report finds that the investigation should not proceed, the President of the Faculty Senate shall terminate the investigation and notify the appropriate persons. If the Committee of Inquiry's report finds that a formal charge and further investigation are warranted, the President of the Faculty Senate shall, within ten (10) calendar days of receipt of the report of the Committee of Inquiry, send a copy of that report to the Dean and to the Committee of Investigation and Recommendation. The President of the Faculty Senate shall also immediately notify the President of Graduate Student Government or President of the Student Body (whichever is appropriate) that a student representative needs to be appointed to the Committee of Investigation and Recommendation. The President of the Faculty Senate shall also notify the Vice President for Academic Affairs and Provost of the Committee of Inquiry's recommendation. No details of the charge will be discussed. *Note:* A majority vote of the Committee of Inquiry is necessary to recommend that a formal charge and further investigation are warranted. A tie vote means that the investigation is terminated as stated herein.

Notification to Degree Holder

The Dean shall issue in writing, within ten (10) calendar days of receipt of the report of the Committee of Inquiry, a formal charge of academic misconduct to the degree holder. This written notice shall detail the factual allegations for the charge and the evidence supporting the charge. This written notice shall also inform the degree holder that if the charges are substantiated, the degree holder's degree could be revoked. This written notice shall also inform the degree holder of his/her right to appear at a hearing as stated in this policy. The Dean shall also send with this notice a copy of this Policy and Procedure on Revocation of Academic Degrees to the degree holder. This notice shall be delivered to the accused in person or sent by certified mail, return receipt requested.

Committee of Investigation and Recommendation

The Committee of Investigation and Recommendation shall extend to the degree holder the following process:

1. Notice of the nature of the complaint
2. Notice of the evidence supporting the complaint
3. Notice of the hearing
4. The opportunity to present evidence, including testimony
5. The opportunity to hear the testimony against the degree holder
6. The opportunity to ask questions of all witnesses
7. The opportunity to have an attorney or advisor present at the hearing; however, the role of the attorney or advisor shall be solely to assist the party, and the attorney or advisor shall not be permitted to participate actively in the proceedings.

The degree holder shall not be entitled to know the identity of the person(s) who originally made the complaint unless that person agrees that his/her identity can be revealed.

The chair of the Committee of Investigation and Recommendation shall inform the degree holder of the time and date of the hearing.

The Dean or his/her designee shall present the accusation against the degree holder at the hearing and may have one additional representative present during the hearing. Under this section the term "Dean" is understood to include the Dean's designee, if such a designation is made.

The degree holder and the Dean may submit written materials to the Committee of Investigation and Recommendation prior to the hearing. The chair of the Committee of Investigation and Recommendation shall make available the materials received to the other party and to all committee members.

The hearing before the Committee of Investigation and Recommendation shall be held no sooner than thirty (30) calendar days and no later than ninety (90) calendar days after receipt of the report of the Committee of Inquiry unless the degree holder and the Dean agree to a different date. All matters pertaining to the hearing shall be kept as confidential as possible and the hearing shall be closed to the public. A verbatim record of the hearing will be made and shall be made a part of the hearing record. The degree holder and the Dean shall be responsible for having any witnesses they wish to testify in attendance at the hearing. Witnesses will be present only while testifying.

The chair of the Committee of Investigation and Recommendation shall take whatever action is necessary during the hearing to ensure a fair, orderly, and expeditious hearing. No formal rules of evidence will be followed. If any objection is made to any evidence being offered, the decision of the majority of the committee shall govern. Irrelevant, immaterial, or unduly repetitious evidence shall be excluded.

The degree holder and the Dean shall be permitted to offer evidence and witnesses pertinent to the issues.

The Dean shall present the case against the accused first. The accused shall then present his/her response.

The chair will allow each party to ask questions of the other party and will allow each party to ask questions of the other party's witnesses at the appropriate time during the hearing as determined by the chair. Members of the committee may ask questions of any party or any witness at any time during the hearing.

Within fifteen (15) calendar days of the conclusion of the hearing, the Committee of Investigation and

Recommendation shall submit a written report to the Vice President for Academic Affairs and Provost. The report shall contain findings and a recommendation as to whether the degree holder's degree should be revoked. The Committee of Investigation and Recommendation must find clear and convincing evidence that serious academic misconduct has been committed in order to recommend the revocation of the degree holder's degree. If the Committee of Investigation and Recommendation does not find clear and convincing evidence of serious academic misconduct, the Committee of Investigation and Recommendation cannot recommend revocation of the degree holder's degree and the matter shall be closed. *Note:* A majority vote of the Committee of Investigation and Recommendation is necessary to recommend the revocation of a degree holder's degree. This means that a tie vote will result in the matter being closed.

At the same time that the report is sent to the Vice President for Academic Affairs and Provost, the chair of the Committee of Investigation and Recommendation shall send a copy of the report to the degree holder, the Dean, and other appropriate persons involved in the process.

If the Committee of Investigation and Recommendation recommends that the degree holder's degree be revoked, the chair shall also send a complete copy of the hearing record to the Vice President for Academic Affairs and Provost. The hearing record shall consist of the transcript of the hearing and all documents that were submitted to the committee. The chair of the Committee of Investigation and Recommendation shall label which documents were submitted by each party when forwarding this information to the Vice President for Academic Affairs and Provost.

If the Committee of Investigation and Recommendation recommends that the degree holder's degree be revoked, the chair shall also send a copy of the transcript of the hearing to the degree holder and the Dean at the same time that it is sent to the Vice President for Academic Affairs and Provost.

Vice President for Academic Affairs and Provost

If the Committee of Investigation and Recommendation recommends that the degree be revoked, the Vice President for Academic Affairs and Provost shall review the hearing record and the report of the Committee of Investigation and Recommendation. If the Vice President for Academic Affairs and Provost decides that the degree holder's degree should not be revoked, he/she shall notify the degree holder, the Dean, the Committee of Investigation and Recommendation and other appropriate persons involved in the process, in writing, within twenty-one (21) calendar days of receipt of the transcript of the hearing, and the matter shall be closed. If the Vice President for Academic Affairs and Provost decides to recommend that the degree holder's degree should be revoked, the Vice President for Academic Affairs and Provost shall send that recommendation in writing to the President of the University within twenty-one (21) calendar days of receipt of the transcript of the hearing. The Vice President for Academic Affairs and Provost shall send to the President, along with his/her recommendation, the Committee of Investigation and Recommendation's report and the hearing record. The Vice President for Academic Affairs and Provost shall send a copy of his/her recommendation

to the degree holder, the Dean, the Committee of Investigation and Recommendation, and other appropriate persons involved in the process.

If the Vice President for Academic Affairs and Provost is disqualified from reviewing the case, the Dean of Undergraduate Studies shall be substituted for the Vice President for Academic Affairs and Provost.

President

If the Vice President for Academic Affairs and Provost recommends to the President that the degree holder's degree should be revoked, the President shall transmit that recommendation along with the report of the Committee of Investigation and Recommendation and the hearing record to the Executive Secretary of the Board of Trustees within thirty (30) calendar days of receipt. If the President wishes to make a recommendation, he/she shall review the recommendation of the Vice President for Academic Affairs and Provost, the report of the Committee of Investigation and Recommendation, and the hearing record and forward his recommendation to the Executive Secretary of the Board of Trustees within thirty (30) calendar days of receiving the recommendation of the Vice President for Academic Affairs and Provost.

Board of Trustees

The Executive Secretary of the Board of Trustees shall send to all trustees the hearing record, the recommendation of the Vice President for Academic Affairs and Provost, the report of the Committee of Investigation and Recommendation, and the recommendation of the President, if any. A majority vote by the Board of Trustees, at a duly constituted Board meeting, is required to revoke an academic degree. The decision of the Board of Trustees shall be final.

Guiding Principles

All actions taken by committees shall be effective by a majority vote.

All investigations, hearings, and actions shall be kept as confidential as possible except for notice of any revocation approved by the Board of Trustees.

A decision not to proceed at any stage of the proceedings set forth in this policy does not necessarily mean that the original complaint was groundless.

For good cause shown, at the request of either party and the approval of the other, the Vice President for Academic Affairs and Provost shall extend any time limit set forth in this policy. Any such time extension shall be communicated in writing to all appropriate parties.

Administrative Action if Degree is Revoked

If a degree is revoked by the Board of Trustees, the former student's transcript will be modified to reflect that the degree was revoked, and the former student will be informed of the revocation and requested to return the diploma. If the former student was enrolled in a program requiring a thesis or dissertation, all bound copies will be removed from the Clemson University Library. In addition, for doctoral students, University Microfilms, Inc. will be notified and requested to take appropriate action.

Students whose degrees have been revoked may be eligible to reapply for admission according to normal University procedures and policies in effect at the time of reapplication.

GENERAL EDUCATION

An undergraduate student whose enrollment in a curriculum occurs after May 15, 2005, must fulfill the general education requirements in effect at that time. If a student withdraws from the University and subsequently returns or does not remain continuously enrolled (summers excluded), the requirements in effect at the time of return will normally prevail. Any variation in curricular or general education requirements shall be considered under the curriculum year change or the substitution procedure.

MISSION STATEMENT

Academic institutions exist for the transmission of knowledge, the pursuit of truth, the intellectual and ethical development of students, and the general well-being of society. Undergraduate students must be broadly educated and technically skilled to be informed and productive citizens. As citizens, they need to be able to think critically about significant issues. Students also need to be prepared to complete undergraduate work and a major course of study. The mission requires a high level of knowledge about and competence in the following areas: communication, computer use, mathematics, problem solving, natural sciences, social sciences, humanities, and arts. Thus, the mission of general education is to provide Clemson undergraduate students with a structured base through which these needs can be met.

REQUIREMENTS

General education requirements are met through a combination of: I. general education coursework; II. coursework specific to the discipline; and III. examples of student work that document the student's achievement of general education competencies in an ePortfolio.

General education requirements in some curricula are more restrictive than those shown below. Science and Technology in Society and Cross-Cultural Awareness Requirements may be satisfied by other General Education courses, as indicated in the footnotes below.

I. General Education Coursework

A. Communication

English Composition 3 credits
ENGL 103 (ENGL 102 for transfer students)

Oral Communication 3 credits
COMM 150, 250, or an approved cluster of courses such as A S 309, 310, 409, 410; or M L 101, 102

B. Mathematical, Scientific, and Technological Literacy

Mathematics 3 credits
EX ST 222¹, 301, MTHSC 101, 102, 106, 107, 108, 203, 207, 301, 309

Natural Science with Lab 4 credits
ASTR 101/103, 102/104, BIOL 103/105, 104/106, 109, 110, 111, 120/121, 120/122, 120/123, 120/124, CH 101, 102, 105¹, 106¹, GEOL 101/103, 102, 112¹/114, PH SC 107, 108, PHYS 122/124, 207/209, 208/210, 221/223, 222/224

Mathematics or Natural Science 3 credits
Any general education Mathematics or Natural Science course listed above or AGRIC (EN SP) 315¹, BIOL 201¹, 203¹, 210¹, 220¹, BIOSC 200¹, 203¹, ENT 200¹, EN SP 200¹, GEOL 300¹, PHYS 240, 245, PL PA 213¹, S T S 216¹

C. Arts and Humanities

Literature 3 credits
Any 200-level ENGL literature course, CHIN 401, FR 300, 304, GER 260, 306, 360, 361, HON H190, H221, ITAL 301, 302, JAPN 401, 406, RUSS 360, 361, SPAN 311, 313

Non-Literature 3 credits
AA H 101, 210², A S L 305², CHIN 499, COMM 303, 304, 308, 309, 402, ENGL 355, 357, FR 307, G W (ENGL) 301, 405, GER 340, HON H191, H201¹, H203, H210, H222, HUM 301, 302, 306, 309², JAPN 307, 308, LANG 340, 342, 346, 348, 356, (ENGL) 454, MUSIC 210², 308, 309, 311, 312, 313, 314², 317, 361, 362, 363, 364, 369, 370, 371, 372, PHIL 101, 102, 103, 124¹, 210¹, (CHIN) 312, (CHIN) 313, 316, 317, 318, 323, 324¹, 325, 326¹, 327, 344, 345¹, REL 101², 102², 301, 302, 303, 306, 307, 315, RUSS 340, S T S 101¹, 102¹, 303, SPAN 307, 308, THEA 210, 279, 308, 309, 315, 316, 317, W S 301

D. Social Sciences

Selected from two different fields 6 credits
ANTH 201², AP EC 202, 257, ECON 200, 211, 212, GEOG 101, 103², 106, HIST 101, 102, 122¹, 124¹, 172², 173², 193², HON H192, H202, H220, P A S 301², PO SC 101, 102², 104², PSYCH 201, 250², 275¹, R S 301, SOC 201, 202

Note: AP EC and ECON are considered the same field.

E. Cross-Cultural Awareness

AA H 210, A S L 305, ANTH 201, AP EC 205¹, CAAH 201, GEOG 103, HIST 172, 173, 193, HON H193, H209, HUM 309, I S 101, 210, MUSIC 210, 314, P A S 301, PO SC 102, 104, PSYCH 250, REL 101, 102, W S 103, or through a University-approved cross-cultural experience

F. Science and Technology in Society

AGRIC (EN SP) 315, AP EC 205², 457, AVS 315, 415, BIOL 201, 203, 210, 220, BIOSC 200, 203, 473, CH 105, 106, COMM 107, 307, CTE 115, 221, ECON 319, EN SP 200, ENGL 349, E N R 312, ENT 200, EX ST 222, FD SC 214, GEOL 112, 270, 300, HIST 122, 124, 321, 323, 392, 424, 491, HLTH 431, I E 488, HON H194, H201, H206, LARCH 116, MKT 445, MS&E 101, MUSIC 318, NURS 140, 333, NUTR 203, 210, PHIL 124, 210, 324, 326, 328, 340, 345, PKGSC 368, PL PA 213, PRTM 211, PSYCH 275, R S (SOC) 401, S T S 101, 102, 120, 171, 216, 301, 303, 498, 499, SOC 203

¹This course also satisfies the Science and Technology in Society Requirement.

²This course also satisfies the Cross-Cultural Awareness Requirement.

II. Discipline-Specific Coursework

A. Academic and Professional Development 2 credits
Departmental courses approved by the Undergraduate Curriculum Committee addressing the general academic and professional development of the student.

B. Distributed Competencies

Each degree program has integrated into its program of study distributed competencies in Communication (written and oral); Critical Thinking; and Ethical Judgment.

III. Documentation of General Education Competencies

Students must provide appropriate documentation of achievement of their General Education competencies through an ePortfolio. Effective oral and written communication is the means by which all competencies will be demonstrated. Students should include an example of their best work in each of the following eight areas:

A. Arts and Humanities

Demonstrate an understanding of the arts and humanities in historical and cultural contexts.

B. Mathematics

Demonstrate mathematical literacy through solving problems, communicating concepts, reasoning mathematically, and applying mathematical or statistical methods, using multiple representations where applicable.

C. Natural Sciences

Demonstrate scientific literacy by explaining the process of scientific reasoning and applying scientific principles inside and outside of the laboratory or field setting.

D. Social Sciences

Demonstrate an understanding of social science methodologies in order to explain the consequences of human actions.

E. Critical Thinking

Demonstrate the ability to critically analyze the quality and utility of knowledge gained throughout the undergraduate experience and apply this knowledge to a wide range of problems.

F. Cross-Cultural Awareness

Demonstrate the ability to critically compare and contrast world cultures in historical and/or contemporary contexts.

G. Ethical Judgment

Demonstrate an ability to identify, comprehend, and deal with ethical problems and their ramifications in a systematic, thorough, and responsible way.

H. Science and Technology in Society

Demonstrate an understanding of issues created by the complex interactions among science, technology, and society.

For more information and instructions about ePortfolio, visit <http://www.clemson.edu/academics/programs/eportfolio>.

MINORS

Clemson University offers 74 baccalaureate degree programs in the Colleges of Agriculture, Forestry and Life Sciences; Architecture, Arts and Humanities; Business and Behavioral Science; Engineering and Science; and Health, Education and Human Development. Bachelor of Arts degree programs require completion of two semesters of a modern foreign language.

MINORS

A minor consists of at least 15 semester hours, with no fewer than nine credits at the 300 level or higher. A student cannot major and minor in the same field or acquire a minor that is not allowed by the degree program. In programs that require a minor, courses may not be used to fulfill both the major and minor requirements. Courses used to fulfill general education requirements, however, may be counted toward the minor. Students are encouraged to contact the department offering the minor for advising. A student may specify one completed minor on the graduation application to be recorded in his/her academic record. Specific requirements are detailed below.

Accounting

A minor in Accounting requires ACCT 201, 204, 311, 312, and nine hours selected from 300- or 400-level accounting courses. Students planning to pursue the Master of Professional Accountancy degree program should select courses in consultation with the school's graduate coordinator.

Adult/Extension Education

A minor in Adult/Extension Education requires AG ED 403, 440, and nine additional credits selected from the following: AG ED 407, 428, ED F (AG ED, CTE) 482, PRTM 308.

Aerospace Studies

A minor in Aerospace Studies requires A S 109, 110, 209, 210, 309, 310, 409, and 410. Completion of A S Leadership Laboratory and participation in cadet activities are mandatory. Students must compete for an allocation and be accepted into the Professional Officer Course before enrolling in A S 309.

Agricultural Business Management

A minor in Agricultural Business Management requires AP EC 302, 309, 319, and at least two courses selected from AP EC 308, 351, 402, 409, 433, 452, 456, 460.

Agricultural Mechanization and Business

A minor in Agricultural Mechanization and Business requires six credit hours selected from AG M 205, 206, 221, 301, 303, AG ED 303; and nine credit hours from AG M 402, 405, 406, 410, 452, 460, 472.

American Sign Language Studies

A minor in American Sign Language Studies requires 15 credit hours in A S L at the 300 or 400 level.

Animal and Veterinary Sciences

A minor in Animal and Veterinary Sciences requires AVS 150 and 151; one course selected from AVS 200, 201, 203, 204, 206, 209; and nine hours selected from any 300- or 400-level AVS courses. A maximum of three credits of AVS 360, 441, 442, 443 or 491 may be used.

Anthropology

A minor in Anthropology requires ANTH 201 and at least six hours selected from ANTH 301, 331, 351, LANG (ANTH) 371. Nine additional hours may be selected from the courses above or from the following: ANTH 320, 403, (W S) 423, 495, 496, 498, CHIN (ANTH) 418, JAPN (ANTH) 417, SOC 433. No more than six credits of ANTH 496 may be counted toward the minor.

Architecture

A minor in Architecture requires ARCH 101, 471, 472, and DSIGN 370. ARCH 471 and 472 and DSIGN 370 are only offered during the summer at study abroad locations.

Athletic Leadership

A minor in Athletic Leadership requires 17 credit hours arranged as follows: A L 349, 350, 353, 361, 362, 376, and one of the following: A L 371, 372, 373, 374, 375, 377. Students must complete a coaching internship or athletic administrative internship (A L 400) with the approval of the Athletic Leadership Coordinator.

Biochemistry

A minor in Biochemistry requires BIOCH 301, 302, and at least 11 credits in any other biochemistry course at the 400 level.

Biological Sciences

A minor in Biological Sciences requires 15 credits and must include both a lecture and corresponding laboratory in animal diversity (BIO SC 302/306 or 303/307) and a lecture and corresponding laboratory in plant diversity (BIO SC 304/308 or 305/309); remaining credits (minimum of seven) must be selected from BIOCH, BIO SC, or GEN courses numbered 300 or higher.

Business Administration

A minor in Business Administration requires ACCT 201, ECON 211, 212, FIN 306, LAW 322, MGT 201, MKT 301.

Chemistry

A minor in Chemistry requires CH 101, 102, and 15 additional credits in Chemistry, at least nine of which must be at the 300 or 400 level, selected in consultation with the Department of Chemistry.

Cluster

The Cluster minor allows students a somewhat wider choice of course materials than is possible with the conventional subject-matter minor. The general requirement for the Cluster minor is 15 credits in courses numbered higher than 300, except where noted differently, chosen according to one of the plans below. Courses within the student's major area may not be included in the Cluster minor.

Group I—Social Sciences: anthropology, economics, geography, history, political science, psychology, sociology

Group II—Life Sciences¹: biochemistry, biological sciences, genetics, microbiology

Group III—Physical Sciences¹: chemistry, geology, physics

Group IV—Engineering¹: courses in all engineering majors plus engineering mechanics and engineering graphics

¹No course in the 100 series is acceptable toward the minor and not more than six hours in the 200 series are acceptable.

Communication Studies

A minor in Communication Studies requires completion of one of the following options:

General—COMM 201 (with a C or better) and 12 additional credits in communication studies, nine of which must be at the 300–400 level. Three hours at the 400 level must be included.

Sports Communication—COMM 201 (with a C or better), COMM 325, 326, 327, and 425

Computer Science

A minor in Computer Science requires CP SC 212 and 12 additional credits in computer science of which at least nine credits must be at the 300 level or higher.

Crop and Soil Environmental Science

A minor in Crop and Soil Environmental Science requires AGRIC 104, CSENV 202, and nine or more credits at the 300 level or higher.

East Asian Studies

A minor in East Asian Studies requires 15 credits, of which at least six credits must be at the 400 level, distributed as follows: three credits from Group I, six additional credits selected from Group I or from Group II, and six credits from Group III:

Group I—CHIN (ANTH) 418, HIST 334, JAPN (ANTH) 417, PO SC 372

Group II—HIST 330, 333, PHIL (CHIN) 312, (CHIN) 313, PO SC 472, 477, REL 314, or any other approved courses selected from department list

Group III—EAS 123, JAPN 401, 499, LANG 401, any Chinese or Japanese language course, or any other approved courses selected from department list

Courses in Groups II and III must represent a combination of Chinese and Japanese courses.

Economics

A minor in Economics requires ECON 314, 315, and nine additional credits from economics courses numbered 300 or higher.

Education

A minor in Education requires ED F 301, 302, 334 or 335, ED SP 370, and three hours from any A L, CTE, ED C, NURS, PRTM, PHIL, PO SC, PSYCH, or SOC course at the 200 level or higher. This minor does not meet the requirements for teacher certification and is not intended for persons who plan to teach in grades K-12.

English

A minor in English requires 15 credits in English above the sophomore level, arranged as follows:

Shakespeare—ENGL 411

British—Three credits from ENGL 396, 397, 407, 408, 410, 414, 415, 416, 417, 418, 433, 444

American—Three credits from ENGL 398, 399, 420, 421, 425, 426, 427, 455

Electives—Six additional credits above the sophomore level, including at least three credits from the 400 level

Entomology

A minor in Entomology requires ENT (BIOSC) 301 and 12 credits in entomology courses at the 300 level or higher.

Entrepreneurship

A minor in Entrepreneurship consists of 15 credits including the following: ACCT 201, ECON (MGT) 306 or 314, and FIN 306. Six credit hours from one of the following tracks are also required:

Planning—MKT (E L E) 314, MGT (E L E) 315

Experiential—E L E 301, 401

Foundations—ECON (E L E) 321, SOC (E L E, PO SC, PSYCH) 356

Note: Not open to business majors except BA in Economics.

Environmental Engineering

A minor in Environmental Engineering requires at least 15 credits as follows: EE&S 401, at least six credits selected from Group I, and at least three credits from Group II. The remaining three credits may be selected from either group. All courses are to be chosen in consultation with the Department of Environmental Engineering and Earth Sciences.

Group I—EE&S 402, 410, 411, 430, (B E) 484, 485, 486

Group II—B E 322, C E 342, 447, CH 223, 411, 413, CH E 401, 450, CSENV (ENTOX, GEOL) 485, EN SP 200, 400, ENTOX 400, (ENT) 430, GEOL 408, MICRO 305, 410

Environmental Science and Policy

A minor in Environmental Science and Policy requires at least 18 credits including EN SP 200, 400, and at least 12 credits from the following:

Group I—Science and Engineering: at least six credits selected from BIOSC 410, 441, 442, 443, 446, CH 413, CSENV 202, (B E) 408, 475, 490, EE&S 401, 402, 430, 485, ENT 300, ENTOX 400, 421, (ENT) 430, FOR 206, W F B 414

Group II—Resource Management: at least two credits selected from AGRIC (EN SP) 315, B E 464, C M E 433, C R D (AP EC) 357, CSENV 404, ECON 319, EE&S (B E) 484, FOR 315, 406, GEOL 300, W F B 306, (BIOSC) 313, 350, 412, 462

Group III—Environmental Policy and Social Impacts: at least two credits selected from AP EC 433, EN SP 472, HIST 392, HLTH 431, PHIL 345, PSYCH 355, R S (SOC) 401, W F B 430

Equine Business

A minor in Equine Business requires AVS 150, 151, and 204; three hours selected from any graded (not pass/fail) 300- or 400-level AVS courses; and six hours selected from AVS 208, 309, 385, 386, 412, or 416.

Film Studies

A minor in Film Studies requires 15 credits in ENGL above the sophomore level, arranged as follows: ENGL 357, 450, (COMM) 451, 452; and one of the following: ART 313, ENGL 348, (THEA) 430, 453, 459, 483, or other course approved by the departmental Director of Undergraduate Studies.

Financial Management

A minor in Financial Management requires FIN 305, 307, 308, 311 and 312.

Food Science

A minor in Food Science requires FD SC 214, 401, and eight additional credits in FD SC or NUTR courses numbered 300 or higher.

Forest Products

A minor in Forest Products requires 15 credits, which must include at least four courses selected from FOR 341, 400, 441, 442, 444, 447. Other courses at the 300 level or above may be selected with a Forest Products advisor's approval.

Forest Resource Management

A minor in Forest Resource Management requires FOR 205, 206, 305, and at least seven additional credits of forestry courses at the 300 level or higher, excluding FOR 300, 400, 419, 447.

Genetics

A minor in Genetics requires GEN 302, 303, and at least 11 credits in any other genetics course at the 400 level.

Geography

The Geography minor consists of three credits of geography at the 100 level and 15 credits of geography at the 300 or 400 level. At least one 400-level geography course must be taken. One of the following courses may be taken as part of the 15-credit, upper-level requirements but may not be substituted for the required 400-level geography course: BIOSC 442, SOC (R S) 471

Geology

A minor in Geology requires GEOL 101, 103, 102, and 12 additional credits in geology, at least nine of which must be drawn from 300-400-level geology courses.

Global Politics

A minor in Global Politics requires PO SC 102 or 104; 361; and 12 additional credits chosen from the list below. At least three of these credits must be from Group I and at least three credits from Group II.

Group I—Comparative Politics: PO SC 371, 372, 466, 471, 472, 473, 476, 477, 478, (LANG) 485

Group II—International Relations: PO SC 362, 363, 367, 375, 428, 429, 456, 457, 459, 461

With the approval of the Political Science department chair, a maximum of three credits from PO SC 305, 311, (SPAN) 382, (FR) 383, or 410 also may be applied toward a Global Politics minor. Students majoring in Political Science may not minor in Global Politics.

Great Works

The Great Works minor requires G W (ENGL) 301 plus one course from each of the following groups. A minimum of nine credits must be at the 400 level.

Group I—Classical Civilization: Three credits from ENGL 403, 429, (COMM) 491, HIST 354, 355, 450, PHIL 315

Group II—Post-Classical Literature: Three credits from ENGL 408, 411, 414, 416, FR 400, G W 403, SPAN 313, 401

Group III—Philosophy, Religion, and Social Thought: Three credits from ENGL 350, HIST 495, PHIL 316, 317, PO SC 450, REL 301, 302, 401

Group IV—The Arts: Three credits from A A H 423, 424, HUM 301, 302, MUSIC 415, 416, THEA 315, 316

Group V—The Sciences: BIOSC 486, ENGL 427, 434, G W 402, 405

History

A minor in History requires 15 credits in history at the 300 and 400 level. Three credits at the 400 level must be included.

Horticulture

A minor in Horticulture requires HORT 101 and 12 additional credits of horticulture courses (excluding HORT 408 and 471), nine credits of which must be at the 300 level or higher. HORT 271 is highly recommended.

International Engineering and Science

The minor in International Engineering and Science, open to students in any major in the College of Engineering and Science, requires

1. Completion of a foreign language through at least 202 and
2. Either (a) nine credits of engineering or science courses at the 300 level or higher transferred from a foreign institution during an approved study abroad program of at least three months or (b) an approved international internship or research program in engineering or science of at least three months duration, plus nine credits chosen from 300-level or higher foreign language courses; ECON 310, 412, 413; and PO SC 361, 362, 371, 375, 472, 477, 478.

The international study, internship, or research program must be approved in advance by the Associate Dean for Undergraduate Studies of the College of Engineering and Science.

Legal Studies

A minor in Legal Studies requires 15 credits at the 300-400 level, with at least six credits selected from Group I, at least six credits selected from Group II, and the remaining three credits selected from either group at the student's option¹:

- Group I—HIST 328, 329, 496, PHIL 343, PO SC 437, 438, SOC 388
- Group II—ECON 402, LAW 322, 333, 405, 420, 499

¹Additional courses may be approved by a committee composed of representatives selected by the Dean of the College of Architecture, Arts and Humanities and by the Dean of the College of Business and Behavioral Science.

Management

A minor in Management requires 15 credits as follows: MGT 201, 307, 310, 318, 390.

Management Information Systems

A minor in Management Information Systems requires 15 credits as follows: ACCT 322 or MGT 318; MGT 411, 452, and two of the following: MGT 312, 454, 455, 456.

Mathematical Sciences

A minor in Mathematical Sciences requires MTHSC 208 and 12 additional credits in mathematical sciences courses numbered 300 or higher.

Microbiology

A minor in Microbiology requires MICRO 305 and 11 additional credits selected from 400-level microbiology courses.

Military Leadership

A minor in Military Leadership requires at least 15 credits including M L 301, 302, 401, 402, and one of the following: HIST 390, NURS 305, or PO SC 428. Completion of Leadership Laboratory and participation in cadet activities are mandatory. (M L 100 and 200 levels may be taken concurrently in the sophomore year.)

Modern Languages

A minor in Modern Languages requires 15 credits from one modern language (Chinese, French, German, Italian, Japanese, or Spanish) from courses at the 300 and 400 levels, including at least one literature course at the 400 level. In French, one of the 300-level courses must be FR 305. FR H438 and H439 and SPAN H438 and H439 may not be used to satisfy requirements for the French or Spanish minor.

Music

A minor in Music requires MUSIC 151, 152, 205, 207, 251, 252; 415 or 416; four semesters of ensemble, totaling four credits, selected from MUSIC 323, 361, 362, 363, 369, 370, 371, 372; and one three-hour music course at the 300-400 level.

Natural Resource Economics

A minor in Natural Resource Economics requires AP EC 457; C R D (AP EC) 357; and three courses selected from AP EC 352, 403, 409, 421, 433, 452, 475, C R D (AP EC) 412, ECON 319.

Nonprofit Leadership

A minor in Nonprofit Leadership requires NPL 300, 390, 490, and one course selected from each of the following areas:

- Group I—COMM 348, 480, PRTM 308
- Group II—ED F 334, 335, PSYCH 340, SOC 350
- Group III—HLTH 401, MKT 428, 429, PRTM 421
- Group IV—MGT 307, PO SC 427, PSYCH 368
- Group V—HLTH 440, PHIL 344, PO SC 321, PRTM 305, 321

Packaging Science

A minor in Packaging Science requires PKGSC 102, 202, 204, and 206; and at least nine credits selected from the following: FD SC 401, 402, FOR 441, 442, G C 405, 406, PKGSC 320, 368, 401, 404, 416, 420, 430, 440, 454, 464.

Pan African Studies

A minor in Pan African Studies requires 18 credits as follows: HIST 311 or 312, P A S 301, and 12 credits arranged as follows:

- Group I—Three credits from GEOG 330, HIST 337, 338, 339, 438, P A S 101, 498
- Group II—Three credits from ENGL 482, 483, PO SC 381, SOC 460, THEA 317
- Group III—Three credits in any 300-400-level course in the social sciences approved by the Director of the Pan African Studies Program
- Group IV—Three credits in any 300-400-level course in the humanities approved by the Director of the Pan African Studies Program

Courses are to be scheduled in consultation with the appropriate advisors. Pan African Studies advisors will provide all affected advisors with a list of approved courses prior to registration.

Park and Protected Area Management

A minor in Park and Protected Area Management requires PRTM 270, 474 and nine additional credits from PRTM 320, 321, 330, 403, (GEOG) 430, 431.

Philosophy

A minor in Philosophy requires 15 credits in philosophy, nine of which must be at the 300 level or above.

Physics

A minor in Physics requires PHYS 122, 221, 222, and nine additional credits in physics courses at the 300 level or higher.

Plant Pathology

A minor in Plant Pathology requires PL PA 310 and 12 credits from the following: BIOSC (PL PA) 425, (PL PA) 426, GEN (BIOSC, MICRO) 418, I P M 401, MICRO 305, or any 300-400-level PL PA courses.

Political Science

A minor in Political Science requires PO SC 101 or 102 or 104 and 15 additional credits at the 300-400 level, nine of which must be selected from three different fields of political science as follows:

- American Government—PO SC 403, 405, 416, 436, 442
- Comparative Politics—PO SC 371, 372, 466, 471, 476, 477, 478
- International Politics—PO SC 361, 362, 363, 375, 429
- Political Theory—PO SC 450, 453
- Public Policy and Public Administration—PO SC 302, 321, 421, 423, 424

At least one 400-level course must be included. No more than a total of three credits from PO SC 310, 311, 312, 409, 410 may be applied to the requirements for a Political Science minor.

Psychology

A minor in Psychology requires PSYCH 201 and 15 credits from PSYCH 275 and/or 300- and 400-level psychology courses. At least one 400-level course must be included.

Public Policy

A minor in Public Policy requires PO SC 321, 421, and 430, plus nine credit hours in courses dealing with specific policy domains and approved by the Department of Political Science.

Religion

A minor in Religion requires 15 credits, nine of which must be at the 300 level or above. PHIL 303 and PO SC 407 may be included.

Russian Area Studies

A minor in Russian Area Studies requires 15 credit hours of which three credits must be in Russian language courses at the 200 level or above. The remaining twelve credits are distributed as follows:

- Group I—Three credits from RUSS 307, 340, 360, 361, 398, 460
- Group II—Three credits from HIST 385, 386, 387, 494
- Group III—Three credits from PO SC 471, 473
- Group IV—Three additional credits from any of the courses listed above

Science and Technology in Society

A minor in Science and Technology in Society requires 15 credits, at least six of which must be at the 400 level. See History Department advisor for list of approved courses.

Screenwriting

A minor in Screenwriting requires 15 credits in ENGL above the sophomore level as follows: ENGL 348, 357, 448 (six credits); and one of the following: ENGL 450, (COMM) 451, 452, 453, THEA (ENGL) 347, or other course approved by the departmental Director of Undergraduate Studies.

Sociology

A minor in Sociology requires SOC 201 and 15 credits from sociology and rural sociology courses numbered 300 or higher. At least one 400-level course must be included.

Spanish-American Area Studies

A minor in Spanish-American Area Studies requires the equivalent of SPAN 202, ECON 410, and 12 credits distributed as follows: six credits from GEOG 340, HIST 340, 341, 342, 440; and six credits from PO SC (SPAN) 382, SPAN 308, 311, 403, 422, 435.

Theatre

A minor in Theatre requires 20 credits arranged as follows: three credits of dramatic literature and history (ENGL 410, 411, 429, (THEA) 430, THEA (ENGL) 347); three credits of theatre history (THEA 315, 316, 317); six credits in a sequence (THEA 278/479, 315/316, (ENGL) 347/447, 372/472, 376/476, 377/477 or 487 or 497); six credits in THEA at the 300-400 level; and two credits of THEA 279.

Therapeutic Recreation

A minor in Therapeutic Recreation requires PRMT 301, 311, 417, and at least two courses selected from PRMT 317, 416, 418, 420.

Travel and Tourism

A minor in Travel and Tourism requires PRMT 301, 342, and nine additional credits from PRMT 343, 344, 349, 392, 398, (GEOG) 430, 441, 444, 445, 446, 447, 498.

Turfgrass

A minor in Turfgrass requires CSENV 202, HORT 212, 412, and two of the following: AG M 402, HORT (CSENV) 433, PL PA (ENT) 406.

Urban Forestry

A minor in Urban Forestry requires a minimum of 16 credits, distributed as follows:

Group I—FOR (HORT) 427, 450, 480, HORT 208

Group II—A minimum of three credits selected from C R P 401, HORT 308

Group III—A minimum of three credits selected from ENT 401 or HORT 303

Wildlife and Fisheries Biology

A minor in Wildlife and Fisheries Biology requires W F B 300, 350; and nine additional hours selected from 300-level or higher W F B courses, except 463.

Women's Studies

A minor in Women's Studies requires 15 credits at the 300 and 400 level, distributed as follows:

Group I—Six credits: W S 301 and any 400-level W S course

Group II—Six credits from courses that deal entirely with women and gender issues: COMM 455, ENGL 380, HIST 318, PHIL (W S) 349, PSYCH 408, SOC 461, SPAN 403, and any additional courses approved for Group II

Group III—Three credits may be earned by taking any approved Women's Studies minor course.

Courses selected in Groups II and III must represent at least two disciplines. Courses are to be scheduled in consultation with the appropriate advisor. The Women's Studies Director will provide all affected advisors with a list of approved courses prior to registration each semester.

Writing

A minor in Writing requires 15 credits as follows:

Business and Technical Option—AP EC 351 or G C 104, CP SC 120, ENGL 304 or 314, 490, 495

Journalism Option—ENGL 231, 333, 334, 335; one of the following: AP EC 351, COMM 250, CP SC 120, CTE 468, ENGL 217, 304, 312, 314, G C 104, PHIL 102, and any course approved by the Chair of the English Department

Writing Pedagogy Option—ENGL 312, 400, 401, 485, and any 300- or 400-level writing course offered by the Department of English

Creative Writing Options

Drama—ENGL (THEA) 430, THEA (ENGL) 347, (ENGL) 447 (six credits), and one of the following: ENGL 312, 410, 411

Fiction—ENGL 345, 432, 445 (six credits), and one of the following: ENGL 312, 418, 425, 426, 428

Poetry—ENGL 346, 431, 446 (six credits), and one of the following: ENGL 312, 416, 417, 428, 444

COLLEGE OF AGRICULTURE, FORESTRY AND LIFE SCIENCES

The mission of the College of Agriculture, Forestry and Life Sciences is to provide teaching, research, and service in agriculture, forestry, and life sciences that will benefit the citizens of South Carolina and the nation. The College of Agriculture, Forestry and Life Sciences serves more than 2,900 graduate and undergraduate students.

The ability to understand and manipulate the molecular structure of biological systems while at the same time understanding their practical management offers immense potential to improve our world, whether it is to improve foods, building products, the environment, or our health. The College of Agriculture, Forestry and Life Sciences is using the same expertise to produce more food on a shrinking globe; package environmentally sound products; grow better foods to fight breast cancer, prevent heart disease, and increase dairy production; increase timber production and provide new fuels; and develop businesses and promote a "green" society.

To assist students in achieving these goals, the William B. Bookhart Jr. Student Services Center provides academic advising and developmental services to promote success for students in the related degree programs. These services involve recruitment and retention, academic advising, multicultural affairs, study abroad, career development, and placement.

The College of Agriculture, Forestry and Life Sciences is impacting the world one graduate at a time—from cell research to food production to packaged materials to the globe—developing partnerships for the future to make the world greener, healthier, tastier, and wealthier.

AGRICULTURAL EDUCATION

Bachelor of Science

Agricultural Education provides broad preparation in agricultural sciences and professional education, including communications and human relations skills. In addition to required courses, students may select a minor. (See page 61.)

The Bachelor's degree prepares students for professional education positions in the mainstream of agriculture, including teaching, cooperative extension service, and government agricultural agencies. The Agricultural Education degree also prepares students for other educational work, such as agricultural missionary, public relations, and training officers in agricultural industry.

In consultation with the departmental advisor, students choose one of the following emphasis areas: Communications, Leadership, or Teaching.

Freshman Year

First Semester

- 1 - AG ED 102 Agric. Education Freshman Seminar
 - 3 - AG ED 200 Agricultural Applications of Educational Technology¹ or
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
 - 3 - AVS 150 Introduction to Animal Science
 - 1 - AVS 151 Introduction to Animal Science Lab.
 - 3 - BIOL 103 General Biology I
 - 1 - BIOL 105 General Biology Lab. I
 - 3 - Mathematics Requirement²
- 15

Second Semester

- 1 - AG ED 100 Orientation and Field Experience
 - 3 - AG ED 103 Multiculturalism in Agric. Ed.
 - 3 - AP EC 202 Agricultural Economics
 - 3 - BIOL 104 General Biology II
 - 1 - BIOL 106 General Biology Lab. II
 - 3 - ENGL 103 Accelerated Composition
 - 3 - Social Science Requirement³
- 17

Sophomore Year

First Semester

- 3 - AG ED 201 Intro. to Agricultural Education
 - 3 - AG ED 203 Teaching Agriscience
 - 3 - AG ED 204 Applied Agriculture Calculations
 - 4 - CH 101 General Chemistry or
 - 4 - CH 105 Chemistry in Context I
 - 3 - HORT 212 Introduction to Turfgrass Culture
 - 1 - HORT 213 Turfgrass Culture Lab.
- 17

Second Semester

- 3 - AG ED 355 Team and Organizational Leadership in Food and Fiber Systems
 - 3 - AG M 205 Principles of Fabrication
 - 3 - BIOL 201 Biotechnology and Society or
 - 3 - BIOSC 200 Biology in the News
 - 4 - CH 102 General Chemistry or
 - 4 - CH 106 Chemistry in Context II
 - 1 - COMM 101 Communication Academic and Professional Development⁴
 - 3 - Arts and Humanities (Literature) Requirement³
- 16-17

¹Students in the Communications and Leadership Emphasis Areas must take AG ED 200. Students in the Teaching Emphasis Area must take a course to satisfy the Arts and Humanities (Non-Literature) Requirement. See General Education Requirements.

²MTHSC 101, 102, 106, or 203

³See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement. Note: GEOG 103 or HIST 193 is recommended to satisfy the Social Science Requirement.

⁴Required of students in Communications Emphasis Area only.

COMMUNICATIONS EMPHASIS AREA

Junior Year

First Semester

- 3 - AG ED 303 Mech. Technology for Agric. Ed.
 - 3 - AG M 221 Surveying
 - 4 - COMM 201 Intro. to Communication Studies
 - 4 - CSENV 202 Soils
 - 3 - FOR 305 Woodland Management or
 - 3 - W F B 412 Wildlife Management
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 20

Second Semester

- 3 - ED F 302 Educational Psychology
 - 3 - HORT 305 Plant Propagation
 - 1 - HORT 306 Plant Propagation Techniques Lab.
 - 3 - Departmental Communication Requirement²
 - 3 - Oral Communication Requirement³
 - 3 - Elective
- 16

Senior Year

First Semester

- 3 - ENGL 231 Introduction to Journalism
 - 3 - HORT 303 Landscape Plants
 - 6 - Departmental Communication Requirement²
 - 3 - Technical Requirement²
- 15

Second Semester

- 12 - AG ED 407 Internship in Extension and Leadership Education⁴
- 12

129 Total Semester Hours

¹See General Education Requirements.

²See advisor.

³See General Education Requirements. COMM 150 or 250 is recommended.

⁴Internship must meet departmental requirements for Communications Emphasis Area. See advisor.

LEADERSHIP EMPHASIS AREA

Junior Year

First Semester

- 3 - AG ED 303 Mech. Technology for Agric. Ed.
 - 3 - AG M 221 Surveying
 - 4 - CSENV 202 Soils
 - 3 - FOR 305 Woodland Management or
 - 3 - W F B 412 Wildlife Management
 - 3 - HORT 303 Landscape Plants
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 19

Second Semester

- 3 - ED F 302 Educational Psychology
 - 3 - HORT 305 Plant Propagation
 - 1 - HORT 306 Plant Propagation Techniques Lab.
 - 3 - Oral Communication Requirement²
 - 3 - Technical Requirement³
 - 3 - Elective
- 16

Senior Year**First Semester**

- 3 - AG ED 403 Principles of Adult, Ext. Educ. or
3 - AG ED 440 Prog. Devel. in Adult, Ext. Ed.
- 3 - AG ED 415 Leadership of Volunteers
- 3 - AG ED 416 Ethics and Issues in Agriculture
and the Food and Fiber System
- 3 - MGT 201 Principles of Management
- 3 - Technical Requirement¹

15

Second Semester

- 12 - AG ED 407 Internship in Extension and
Leadership Education

12

127 Total Semester Hours

¹See General Education Requirements.²See General Education Requirements. COMM 150 or 250 is recommended.³See advisor.**TEACHING EMPHASIS AREA****Junior Year****First Semester**

- 3 - AG ED 200 Agricultural Applications of
Educational Technology¹
- 3 - AG ED 303 Mech. Technology for Agric. Ed.
- 3 - AG M 221 Surveying
- 4 - CSENV 202 Soils
- 3 - FOR 305 Woodland Management or
3 - W F B 412 Wildlife Management
- 3 - HORT 303 Landscape Plants

19

Second Semester

- 3 - ED F 302 Educational Psychology
- 3 - HORT 305 Plant Propagation
- 1 - HORT 306 Plant Propagation Techniques Lab.
- 3 - Oral Communication Requirement²
- 3 - Technical Requirement¹
- 3 - Elective

16

Senior Year**First Semester**

- 1 - AG ED 400 Supervised Field Experience II
- 3 - AG ED 401 Instructional Methods in Ag. Ed.
- 3 - AG ED 403 Principles of Adult, Ext. Educ. or
3 - AG ED 440 Prog. Devel. in Adult, Ext. Ed.
- 2 - AG ED 423 Curriculum
- 3 - Technical Requirement¹

12

Second Semester

- 12 - AG ED 406 Directed Teaching
- 2 - AG ED 425 Teaching Agricultural Mechanics

14

126 Total Semester Hours

ED F 315 may be substituted. In this case, ED F 425 must be taken in the semester immediately prior to directed teaching.

¹See General Education Requirements. COMM 150 or 250 is recommended.²See advisor.**AGRICULTURAL
MECHANIZATION AND
BUSINESS****Bachelor of Science**

The Agricultural Mechanization and Business major provides a program for students who desire training in areas relevant to dynamic agricultural enterprise. The program is organized with strength in both business management and technical support of agriculture and agribusiness. To produce well rounded individuals with good communication skills, the curriculum includes courses in the humanities, social sciences, English composition, and public speaking.

Graduates in Agricultural Mechanization and Business find meaningful and remunerative employment in a variety of situations directly and indirectly related to agricultural production, processing, marketing, and the many services connected therewith. Farming and technical sales in the agricultural, industrial, and heavy equipment industries are frequently chosen careers.

By completing this curriculum, graduates will have fulfilled the requirements for an Agricultural Business Management minor or other selected minor. Contact the Enrolled Student Services Office to have the minor recorded.

Additional information is available from the departmental offices or can be found at www.clemson.edu/agbioeng/agmech/index.htm.

Freshman Year**First Semester**

- 3 - AG ED 200 Agricultural Applications of
Educational Technology
- 1 - AG M 101 Intro. to Ag. Mech. and Business
- 3 - AG M 205 Principles of Fabrication
- 3 - BIOL 103 General Biology I
- 1 - BIOL 105 General Biology Lab. I
- 3 - MTHSC 102 Intro. to Mathematical Analysis

14

Second Semester

- 3 - ACCT 201 Financial Accounting Concepts
- 3 - BIOL 104 General Biology II
- 1 - BIOL 106 General Biology Lab. II
- 3 - ENGL 103 Accelerated Composition
- 3 - EX ST 301 Introductory Statistics
- 3 - Elective

16

Sophomore Year**First Semester**

- 3 - AP EC 202 Agricultural Economics
- 4 - CH 105 Chemistry in Context I
- 4 - PHYS 200 Introductory Physics or
3 - PHYS 207 General Physics I and
1 - PHYS 209 General Physics I Lab.
- 3 - Arts and Humanities (Non-Lit.) Requirement

14

Second Semester

- 3 - AG M 206 Machinery Management
- 3 - AG M 303 Calculations for Mechanized Agric.
- 4 - CH 106 Chemistry in Context II
- 4 - CSENV 202 Soils
- 2 - E G 209 Intro. to Engr./Comp./Graphic

16

Junior Year**First Semester**

- 3 - AG M 221 Surveying
- 3 - AG M 301 Soil and Water Conservation
- 3 - AG M 460 Electrical Systems
- 3 - Arts and Humanities (Literature) Requirement
- 3 - Agribusiness Requirement
- 3 - Minor Requirement

18

Second Semester

- 3 - AG M 406 Mechanical and Hydraulic Systems
- 3 - COMM 250 Public Speaking
- 3 - Agribusiness Requirement
- 3 - Minor Requirement
- 3 - Elective

15

Senior Year**First Semester**

- 3 - AG M 402 Landscape Drainage and Irrigation
- 3 - AG M 405 Agricultural Structures and
Environmental Control
- 3 - Minor Requirement
- 3 - Plant/Crop Science Requirement⁴
- 3 - Social Science Requirement

15

Second Semester

- 3 - AG M 410 Precision Agriculture Technology
- 3 - AG M 452 Mobile Power
- 3 - AG M 472 Capstone
- 3 - Agribusiness Requirement
- 3 - Plant/Crop Science Requirement⁴ or
3 - Soil Science Requirement⁵

15

123 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.²APEC 302, 308, 309, 319, 351, 402, 409, 433, 452, 456, or 461. This course may also be used to satisfy minor requirements.³See Agricultural Business Management minor or minor other approved minor. If requirements for an approved minor have already been satisfied, this course must be for 300 level (or higher) course from an approved program.⁴CSENV 405, 407, 417, 421, 422, 423, 425, AP EC 425, HORT 212, 305, CSENV 433, 455, 456, PL PA 300, GENT 406, 411, or 459. This course may also satisfy minor requirements.⁵CSENV 403, 404, 446, 452, GENT EX, GE EL 485, or 444. This course may also be used to satisfy minor requirements.

ANIMAL AND VETERINARY SCIENCES

Bachelor of Science

The Animal and Veterinary Sciences curriculum provides students with both a basic and applied understanding of the scientific principles needed for successful careers in the scientific, technical, and business phases of livestock and poultry production, processing, and marketing. Strengths of this program include extensive hands-on instruction at Clemson's five animal farms, personalized advising, and the opportunity for valued-added experiences, including involvement in research, teaching, extension, international travel, and internships. Students choose from three concentrations.

The Animal Agribusiness Concentration prepares students for careers in the many facets of the animal industries, including production, sales and marketing, business management, advertising, and extension. The Equine Business Concentration prepares students for such professions as trainers, managers, riding instructors, sales or media representatives, breed association representatives or for equine entrepreneurial careers such as owners of tack shops, boarding facilities, or riding schools. The Preveterinary and Science Concentration prepares students to meet the requirements for most veterinary schools, graduate schools, and medical and dental schools. Students with South Carolina residency may compete for contract seats at Mississippi State, Tuskegee, and University of Georgia Colleges of Veterinary Medicine. Experienced preprofessional advising is provided for all students pursuing advanced degrees.

ANIMAL AGRIBUSINESS CONCENTRATION

Freshman Year

First Semester

- 1 - AVS 100 Orientation to Animal and Vet. Sci.
- 3 - AVS 150 Introduction to Animal Science
- 1 - AVS 151 Introduction to Animal Science Lab.
- 3 - BIOL 103 General Biology I and
- 1 - BIOL 105 General Biology Lab. I or
- 5 - BIOL 110 Principles of Biology I
- 4 - CH 101 General Chemistry
- 3 - Arts and Humanities (Non-Lit.) Requirement¹

16-17

Second Semester

- 3 - BIOL 104 General Biology II and
- 1 - BIOL 106 General Biology Lab. II or
- 5 - BIOL 111 Principles of Biology II
- 4 - CH 102 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 3 - MTHSC 101 Essen. Math. for Informed Soc. or
- 3 - MTHSC 102 Intro. to Math. Analysis or
- 4 - MTHSC 106 Calculus of One Variable I
- 2 - AVS Techniques Requirement²

16-18

Sophomore Year

First Semester

- 3 - ACCT 201 Financial Accounting Concepts
- 3 - CSENV 423 Field Crops—Forages
- 3 - EX ST 301 Introductory Statistics
- 3 - MGT 201 Principles of Management
- 2 - AVS Techniques Requirement²

14

Second Semester

- 3 - ECON 211 Principles of Microeconomics
- 3 - FIN 306 Corporation Finance
- 3 - Arts and Humanities (Literature) Requirement¹
- 2 - AVS Evaluation Requirement³
- 2 - AVS Techniques Requirement²
- 3 - Social Science Requirement¹

16

Junior Year

First Semester

- 4 - AVS 301 Anat. and Phys. of Domestic Animals
- 3 - AVS 370 Principles of Animal Nutrition
- 3 - AVS 470 Animal Genetics
- 3 - ECON 212 Principles of Macroeconomics
- 3 - Elective

16

Second Semester

- 3 - AVS 375 Applied Animal Nutrition
- 3 - AVS 413 Animal Products
- 3 - AVS 453 Animal Reproduction
- 3 - LAW 322 Legal Environment of Business
- 3 - Elective

15

Senior Year

First Semester

- 3 - AVS 310 Animal Health
- 3 - AVS 415 Contemporary Issues in Animal Sci.
- 3 - MKT 301 Principles of Marketing
- 3 - AVS Experience-Based Activity⁴
- 2 - AVS Techniques Requirement²

14

Second Semester

- 2 - AVS 406 Seminars and Related Topics
- 3 - AVS 410 Domestic Animal Behavior
- 2 - AVS 417 Animal Agribusiness Development
- 4 - AVS 450 Sustainable Livestock Production Sys.
- 3 - AVS Experience-Based Activity⁴
- 2 - Elective

16

123–126 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

²AVS 200, 201, 203, 204, 206, 209 or 455

³AVS 302, 309, 311, or 323

⁴AVS 360, 441, 442, 443, or 491

EQUINE BUSINESS CONCENTRATION

Freshman Year

First Semester

- 1 - AVS 100 Orientation to Animal and Vet. Sci.
- 3 - AVS 150 Introduction to Animal Science
- 1 - AVS 151 Introduction to Animal Science Lab.
- 3 - BIOL 103 General Biology I and
- 1 - BIOL 105 General Biology Lab. I or
- 5 - BIOL 110 Principles of Biology I
- 4 - CH 101 General Chemistry
- 3 - Arts and Humanities (Non-Lit.) Requirement¹

16-17

Second Semester

- 3 - BIOL 104 General Biology II and
- 1 - BIOL 106 General Biology Lab. II or
- 5 - BIOL 111 Principles of Biology II
- 4 - CH 102 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 3 - MTHSC 101 Essen. Math. for Informed Soc. or
- 3 - MTHSC 102 Intro. to Math. Analysis or
- 4 - MTHSC 106 Calculus of One Variable I
- 2 - AVS Techniques Requirement²

16-18

Sophomore Year

First Semester

- 3 - ACCT 201 Financial Accounting Concepts
- 2 - AVS 204 Horse Care Techniques
- 3 - CSENV 423 Field Crops—Forages
- 3 - EX ST 301 Introductory Statistics
- 3 - MGT 201 Principles of Management

14

Second Semester

- 2 - AVS 309 Principles of Equine Evaluation
- 3 - ECON 211 Principles of Microeconomics
- 3 - FIN 306 Corporation Finance
- 3 - Arts and Humanities (Literature) Requirement¹
- 2 - AVS Techniques Requirement²
- 3 - Social Science Requirement¹

16

Junior Year

First Semester

- 4 - AVS 301 Anat. and Phys. of Domestic Animals
- 3 - AVS 370 Principles of Animal Nutrition
- 3 - AVS 470 Animal Genetics
- 3 - ECON 212 Principles of Macroeconomics
- 2 - AVS Techniques Requirement²

15

Second Semester

- 3 - AVS 375 Applied Animal Nutrition
- 3 - AVS 453 Animal Reproduction
- 3 - LAW 322 Legal Environment of Business
- 3 - MKT 301 Principles of Marketing
- 3 - Elective

15

Senior Year**First Semester**

- 3 - AVS 310 Animal Health
- 2 - AVS 406 Seminars and Related Topics
- 3 - AVS 415 Contemporary Issues in Animal Sci.
- 4 - AVS 416 Equine Exercise Physiology
- 2 - AVS Experience-Based Activity³

14

Second Semester

- 3 - AVS 410 Domestic Animal Behavior
- 4 - AVS 412 Advanced Equine Management
- 2 - AVS 417 Animal Agribusiness Development
- 6 - Elective

15

121-124 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

²AVS 200, 201, 203, 206, 209 or 455

³AVS 360, 441, 442, 443, or 491

PREVETERINARY AND SCIENCE CONCENTRATION**Freshman Year****First Semester**

- 1 - AVS 100 Orientation to Animal and Vet. Sci.
- 3 - AVS 150 Introduction to Animal Science
- 1 - AVS 151 Intro. to Animal Science Lab.
- 3 - BIOL 103 General Biology I and
- 1 - BIOL 105 General Biology Lab. I or
- 5 - BIOL 110 Principles of Biology I
- 4 - CH 101 General Chemistry
- 3 - Arts and Humanities (Non-Lit.) Requirement¹

16-17

Second Semester

- 3 - BIOL 104 General Biology II and
- 1 - BIOL 106 General Biology Lab. II or
- 5 - BIOL 111 Principles of Biology II
- 4 - CH 102 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 3 - MTHSC 102 Intro. to Math. Analysis or
- 4 - MTHSC 106 Calculus of One Variable I
- 2 - AVS Techniques Requirement²

16-18

Sophomore Year**First Semester**

- 3 - CH 223 Organic Chemistry
- 1 - CH 227 Organic Chemistry Lab.
- 3 - PHYS 207 General Physics I
- 1 - PHYS 209 General Physics I Lab.
- 3 - Arts and Humanities (Literature) Requirement¹
- 2 - AVS Techniques Requirement²
- 3 - Social Science Requirement³

16

Second Semester

- 3 - CH 224 Organic Chemistry
- 1 - CH 228 Organic Chemistry Lab.
- 3 - EX ST 301 Introductory Statistics or
- 3 - MTHSC 203 Elem. Statistical Inference
- 3 - PHYS 208 General Physics II
- 1 - PHYS 210 General Physics II Lab.
- 2 - AVS Evaluation Requirement⁴ or
- 3 - Oral Communication Requirement
- 2 - AVS Techniques Requirement

15-16

Junior Year**First Semester**

- 4 - AVS 301 Anat. and Phys. of Domestic Animals
- 3 - AVS 310 Animal Health
- 3 - AVS 370 Principles of Animal Nutrition
- 3 - BIOCH 301 Molecular Biochemistry or
- 3 - BIOCH 305 Essential Elements of Bioch. or
- 3 - BIOCH 406 Physiological Chemistry
- 3 - Departmental Requirement⁴

16

Second Semester

- 3 - AVS 375 Applied Animal Nutrition
- 3 - AVS 453 Animal Reproduction
- 3 - GEN 300 Fundamental Genetics⁵
- 1 - GEN 301 Fundamental Genetics Lab.⁵
- 4 - MICRO 305 General Microbiology⁵

14

Senior Year**First Semester**

- 2 - AVS 406 Seminars and Related Topics
- 3 - AVS 415 Contemporary Issues in Animal Sci.
- 2 - AVS Techniques Requirement²
- 3 - Departmental Requirement⁴
- 3 - Elective

13

Second Semester

- 3 - AVS 410 Domestic Animal Behavior
- 3 - AVS 413 Animal Products
- 3 - AVS Experience-Based Activity⁶
- 3 - Departmental Requirement⁴
- 3 - Social Science Requirement¹

15

121-125 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

²AVS 200, 201, 203, 204, 206, or 209

³AVS 302, 309, 311, and 323 satisfy Oral Communication requirement. Students applying to veterinary school early (junior year) must have received credit for the Oral Communication requirement

⁴Select nine hours from any graded (not pass/fail) 300- or 400-level course and/or any of the following 100- or 200-level courses: ACCT 201, AP EC 202 or ECON 211, ECON 212, CSENV 202, MGT 201, BIOSC 222, 223, SPAN 101, 102

⁵May be taken either semester of the junior year

⁶AVS 360, 441, 442, 443, or 491

APPLIED ECONOMICS AND STATISTICS**Bachelor of Science**

The Applied Economics and Statistics curriculum helps the student build a strong understanding of economic principles as applied in agribusiness, community and economic development, and other fields. Courses in applied statistics and quantitative methods help build decision-making and problem-solving skills and acquaint the student with tools for data analysis.

In the Agribusiness Emphasis Area, core courses focus on agribusiness management, leadership, marketing and sales, finance, accounting, and other business skill development. Employment opportunities for Agribusiness graduates are many and diverse. Private sector opportunities include agribusiness management, banking, finance, sales, marketing, and public relations. Public sector opportunities include positions in organizations that promote food, agriculture, and natural resource interests; government agencies; and educational institutions.

The Economic and Statistical Analysis Emphasis Area contains most of the same courses as the Agribusiness Emphasis Area with increased requirements in calculus, matrix algebra, and probability theory. This more rigorous mathematics preparation provides a stronger foundation for graduate study or career skill development in quantitative economics or probability and statistics.

In the Community and Economic Development Concentration, core courses focus on community development methods, regional economic development, leadership, experiential learning, communication skills, and behavioral science principles. Employment opportunities for Community and Economic Development graduates include positions in social science administration, management, and research. Other careers include community development and economic development specialist positions with local, county, and state governments. Additional opportunities exist in a variety of agencies, research and consulting firms, foundations and councils, financial institutions, public and private utilities, and organizations looking for entrepreneurial skills.

In all three plans of study, there is an increasing emphasis on globalization and information technology. Students are encouraged to participate on a creative inquiry student research team and to take advantage of an internship and/or study abroad opportunity. All three study options provide an excellent background for professional or graduate study in several disciplines.

For students interested in economics and natural resources, the Department of Applied Economics and Statistics also administers the Natural Resource and Economic Policy Concentration within the Environmental and Natural Resources degree program. See page 50 for program details.

AGRIBUSINESS EMPHASIS AREA

Freshman Year

First Semester

- 3 - AP EC 205 Agriculture and Society
- 2 - C U 101 University Success Skills
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 4 - Natural Science Requirement¹
- 3 - Oral Communication Requirement¹
- 15

Second Semester

- 3 - AP EC 202 Agricultural Economics
- 3 - ENGL 103 Accelerated Composition
- 3 - EX ST 222 Statistics in Everyday Life
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 3 - Elective
- 15

Sophomore Year

First Semester

- 3 - ACCT 201 Financial Accounting Concepts
- 3 - EX ST 301 Introductory Statistics
- 3 - MGT 201 Principles of Management
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - Elective
- 15

Second Semester

- 3 - ACCT 202 Managerial Accounting Concepts
- 3 - AP EC 302 Economics of Farm Management
- 3 - AP EC 308 Quantitative Applied Economics
- 3 - ECON 212 Principles of Macroeconomics
- 3 - Social Science Requirement¹
- 15

Junior Year

First Semester

- 3 - AP EC 309 Econ. of Agricultural Marketing *or*
- 3 - MKT 301 Principles of Marketing
- 3 - AP EC 402 Production Economics
- 3 - ECON (MGT) 306 Managerial Economics *or*
- 3 - ECON 314 Intermediate Microeconomics
- 3 - ENGL 314 Technical Writing
- 3 - Agribusiness Requirement²
- 15

Second Semester

- 3 - AP EC 319 Agribusiness Management
- 3 - AP EC 421 Globalization *or*
- 3 - ECON 310 International Economy
- 3 - C R D 335 Leadership in Organizations and Communities
- 3 - EX ST 462 Statistics Applied to Economics
- 3 - Agribusiness Requirement²
- 15

Senior Year

First Semester

- 3 - AP EC 409 Commodity Futures Markets
- 3 - AP EC 460 Agricultural Finance
- 3 - ECON 302 Money and Banking *or*
- 3 - ECON 315 Intermediate Macroeconomics
- 3 - LAW 322 Legal Environment of Business
- 3 - Agribusiness Requirement²
- 15

Second Semester

- 3 - AP EC 452 Agricultural Policy
- 3 - AP EC 456 Prices
- 3 - AP EC 490 Selected Topics
- 6 - Agribusiness Requirement²
- 15

120 Total Semester Hours

¹See General Education Requirements.

²See advisor.

ECONOMIC AND STATISTICAL ANALYSIS EMPHASIS AREA

Freshman Year

First Semester

- 3 - AP EC 205 Agriculture and Society
- 2 - C U 101 University Success Skills
- 4 - MTHSC 106 Calculus of One Variable I
- 4 - Natural Science Requirement¹
- 3 - Oral Communication Requirement¹
- 16

Second Semester

- 3 - AP EC 202 Agricultural Economics
- 3 - ENGL 103 Accelerated Composition
- 3 - EX ST 222 Statistics in Everyday Life
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 4 - MTHSC 108 Calculus of One Variable II
- 16

Sophomore Year

First Semester

- 3 - EX ST 301 Introductory Statistics
- 3 - MGT 201 Principles of Management
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - Elective
- 16

Second Semester

- 3 - ACCT 202 Managerial Accounting Concepts
- 3 - AP EC 302 Economics of Farm Management
- 3 - AP EC 308 Quantitative Applied Economics
- 3 - ECON 212 Principles of Macroeconomics
- 3 - Social Science Requirement¹
- 15

Junior Year

First Semester

- 3 - AP EC 309 Econ. of Agricultural Marketing *or*
- 3 - MKT 301 Principles of Marketing
- 3 - AP EC 402 Production Economics
- 3 - ECON (MGT) 306 Managerial Economics *or*
- 3 - ECON 314 Intermediate Microeconomics
- 3 - ENGL 304 Business Writing *or*
- 3 - ENGL 314 Technical Writing
- 3 - MTHSC 210 Applied Matrix Algebra
- 15

Second Semester

- 3 - AP EC 319 Agribusiness Management
- 3 - AP EC 421 Globalization *or*
- 3 - ECON 310 International Economy
- 3 - C R D 335 Leadership in Organizations and Communities
- 3 - EX ST 462 Statistics Applied to Economics
- 3 - MTHSC 400 Theory of Probability
- 15

Senior Year

First Semester

- 3 - AP EC 409 Commodity Futures Markets
- 3 - AP EC 460 Agricultural Finance
- 3 - LAW 322 Legal Environment of Business
- 6 - Agribusiness Requirement²
- 15

Second Semester

- 3 - AP EC 452 Agricultural Policy
- 3 - AP EC 456 Prices
- 3 - AP EC 490 Selected Topics
- 3 - ECON 302 Money and Banking *or*
- 3 - ECON 315 Intermediate Macroeconomics
- 12

120 Total Semester Hours

¹See General Education Requirements.

²See advisor.

COMMUNITY AND ECONOMIC DEVELOPMENT CONCENTRATION

Freshman Year

First Semester

- 3 - CP SC 120 Intro. to Information Technology
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 3 - Science and Tech. in Society Requirement¹
- 3 - Social Science Requirement²
- 15

Second Semester

- 3 - ACCT 201 Financial Accounting Concepts
- 3 - ENGL 103 Accelerated Composition
- 4 - Natural Science Requirement¹
- 5 - Elective
- 15

Sophomore Year

First Semester

- 3 - EX ST 301 Introductory Statistics
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - Microeconomics Requirement³
- 3 - Oral Communication Requirement¹
- 3 - Elective
- 15

Second Semester

- 3 - C R D (AP EC) 357 Natural Res. Economics
- 3 - ECON 212 Principles of Macroeconomics
- 3 - ENGL 314 Technical Writing
- 3 - PO SC 302 State and Local Government
- 3 - Behavioral Science Requirement⁴
- 15

Junior Year

First Semester

- 3 - C R D 335 Leadership in Organizations and Communities
- 3 - ECON (MGT) 306 Managerial Economics or
3 - ECON 314 Intermediate Microeconomics
- 3 - Behavioral Science Requirement⁴
- 3 - Emphasis Area Requirement⁷
- 3 - Marketing Requirement⁶

15

Second Semester

- 3 - AP EC 352 Public Finance
- 3 - C R D 336 Community Development Methods
- 3 - Behavioral Science Requirement⁴
- 3 - Emphasis Area Requirement⁵
- 3 - Planning Requirement⁵

15

Senior Year

First Semester

- 3 - C R D (AP EC) 411 Regional Impact Analysis
- 3 - EX ST 462 Statistics Applied to Economics
- 3 - R S (SOC) 459 The Community
- 6 - Emphasis Area Requirement⁵

15

Second Semester

- 3 - C R D (AP EC) 412 Regional Economic Development Theory and Policy
- 3 - Behavioral Science Requirement⁴
- 3 - Comm. and Econ. Dev. Practice/Applications⁷
- 6 - Emphasis Area Requirement⁵

15

120 Total Semester Hours

⁴See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

⁵PO SC 101, 102, or SOC 201

⁶AP EC 202, 257, or ECON 211

⁷Select from 300-400-level courses in ANTH, AP EC, C R D, C R P, ECON, MGT, MKT, PO SC, PSYCH, or SOC

⁸See advisor.

⁹AP EC 309, 351, or MKT 301

¹⁰AP EC 490, C R D (AP EC) 491, or 492

BIOCHEMISTRY

Bachelor of Science

Biochemistry is the study of the molecular basis of life. To comprehend current biochemical information and make future contributions to our molecular understanding of life processes, students must obtain a broad background in biology and a firm foundation in chemistry, mathematics, and physics. This is the basis of the biochemistry curriculum.

The program provides an excellent educational background for professional school (medicine, dentistry, or veterinary medicine) and graduate school in biochemistry, molecular biology, or another biological science discipline. Graduates will find employment opportunities in the research and service programs of universities, medical schools, hospitals, research institutes, and industrial and government laboratories.

Freshman Year

First Semester

- 1 - BIOCH 103 Careers in Biochem. and Genetics
- 5 - BIOL 110 Principles of Biology I
- 4 - CH 101 General Chemistry
- 4 - MTHSC 106 Calculus of One Variable I

14

Second Semester

- 5 - BIOL 111 Principles of Biology II
- 4 - CH 102 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 108 Calculus of One Variable II

16

Sophomore Year

First Semester

- 3 - CH 223 Organic Chemistry
- 1 - CH 227 Organic Chemistry Lab.
- 3 - GEN 302 Molecular and General Genetics
- 1 - GEN 303 Molecular and Gen. Genetics Lab.
- 3 - PHYS 122 Physics with Calculus I
- 1 - PHYS 124 Physics Lab. I
- 3 - Advanced Mathematics Requirement¹

15-16

Second Semester

- 3 - BIOCH 301 Molecular Biochemistry
- 3 - CH 224 Organic Chemistry
- 1 - CH 228 Organic Chemistry Lab.
- 3 - COMM 150 Intro. to Human Comm. or
3 - COMM 250 Public Speaking
- 3 - PHYS 221 Physics with Calculus II
- 1 - PHYS 223 Physics Lab. II
- 3 - Arts and Humanities (Literature) Requirement²

17

Junior Year

First Semester

- 3 - BIOCH 431 Physical Approach to Biochem.
- 2 - BIOCH 433 General Biochemistry Lab. I
- 3 - CH 330 Introduction to Physical Chemistry³
- 3 - Science Requirement⁴
- 5 - Elective

16

Second Semester

- 3 - BIOCH 432 Biochemistry of Metabolism
- 2 - BIOCH 434 General Biochemistry Lab. II
- 3 - BIOCH 436 Molecular Biol.: Genes to Proteins
- 3 - PHIL 326 Science and Values
- 3 - Science Requirement⁴

14

Senior Year

First Semester

- 3 - BIOSC 461 Cell Biology
- 3 - GEN (BIOCH) 440 Bioinformatics
- 3 - Social Science Requirement⁷
- 5 - Elective⁵

14

Second Semester

- 2 - BIOCH 493 Senior Seminar
- 3 - Science Requirement⁴
- 3 - Social Science Requirement⁷
- 6 - Elective⁵

14

120-121 Total Semester Hours

EX ST 301, MTHSC 206, 401, or 402

¹See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

²CH 331 may be substituted.

³BIOSC 222, 223, or any course at 300 level or above in BIOCH, BIOE, BIOSC, CH, EX ST, GEN, MICRO, MTHSC, and PHYS. A maximum of three credit hours may be selected from undergraduate research courses (491 creative inquiry or similar course). Other courses must be approved by advisor.

⁴A two-semester sequence of a foreign language is strongly recommended.

⁵Notes

1. A student is allowed to enroll in science and mathematics courses only which all prerequisites have been met with a grade of C or higher.

2. A minimum grade of C- is required in all science and mathematics courses. No student may exceed a maximum of two attempts, excluding a W, to complete successfully any science or mathematics course.

BIOLOGICAL SCIENCES

Bachelor of Science

Biology encompasses the broad spectrum of the modern life sciences, including the study of all aspects of life from the structure and function of the whole organism down to the subcellular levels and up through the interactions of organisms to the integrated existence of life on the entire planet. Descriptive, structural, functional, and evolutionary questions are explored through the hierarchy of the organization of life. Applications of current advances to the health and well-being of man and society, to nature and the continuation of earth as a balanced ecosystem, and to an appreciation of the place of natural science in our cultural heritage receive emphasis.

Majors in Biological Sciences receive classroom, laboratory, and field training in biology with an emphasis on chemistry, mathematics, and physics as necessary tools. The Bachelor of Science in Biological Sciences curriculum prepares students for graduate study in any of the life science areas (such as agricultural sciences, biochemistry, botany, cell and molecular biology, conservation, ecology and environmental science, entomology, forestry, genetics, industrial and regulatory biology, microbiology, morphology, physiology, wildlife biology, and zoology) for the health professions (medicine, dentistry, etc.), veterinary medicine, and for science teaching.

Combined Bachelor of Science in Biological Sciences/Master of Science in Bioengineering

Under this plan, students may reduce the time necessary to earn both degrees by applying graduate credits to both undergraduate and graduate program requirements. See *Academic Regulations* in this catalog for enrollment guidelines and procedures. Students are encouraged to obtain the specific requirements for the dual degree from the Department of Biological Sciences or Bioengineering as early as possible in their undergraduate program as a number of required courses have prerequisites not normally taken by Biological Sciences majors.

Freshman Year**First Semester**

- 5 - BIOL 110 Principles of Biology I¹
- 1 - BIOSC 101 Frontiers in Biology I
- 4 - CH 101 General Chemistry
- 3 - COMM 150 Intro. to Human Communication or
- 3 - COMM 250 Public Speaking
- 4 - MTHSC 106 Calculus of One Variable I

17

Second Semester

- 5 - BIOL 111 Principles of Biology II¹
- 1 - BIOSC 102 Frontiers in Biology II
- 4 - CH 102 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 111 Calculus II for Biologists

17

Sophomore Year**First Semester**

- 3 - CH 223 Organic Chemistry and
- 1 - CH 227 Organic Chemistry Lab. or
- 4 - CH 201 Survey of Organic Chemistry
- 4 - Animal or Plant Diversity Requirement²
- 3 - Arts and Humanities (Literature) Requirement³
- 3 - Biochemistry or Genetics Requirement⁴

14

Second Semester

- 3 - CH 224 Organic Chemistry and
- 1 - CH 228 Organic Chemistry Laboratory⁵ or
- 4 - Major Requirement⁶
- 4 - Animal or Plant Diversity Requirement²
- 3 - Biochemistry or Genetics Requirement⁴
- 5 - Major Requirement⁶

16

Junior Year**First Semester**

- 3 - BIOSC 335 Evolutionary Biology
- 3 - BIOSC 461 Cell Biology
- 2 - BIOSC 462 Cell Biology Lab.
- 3 - ENGL 315 Scientific Writing and Comm.
- 3 - PHYS 207 General Physics I and
- 1 - PHYS 209 General Physics I Lab. or
- 3 - PHYS 122 Physics with Calculus I and
- 1 - PHYS 124 Physics Lab. I

15

Second Semester

- 3 - PHYS 208 General Physics II and
- 1 - PHYS 210 General Physics II Lab. or
- 3 - PHYS 221 Physics with Calculus II and
- 1 - PHYS 223 Physics Lab. II
- 3 - Arts and Humanities (Non-Lit.) Requirement³
- 5 - Major Requirement⁶
- 3 - Social Science Requirement³

15

Senior Year**First Semester**

- 2 - BIOSC 493 Senior Seminar
- 13 - Major Requirement⁶

15

Second Semester

- 12 - Major Requirement⁶
- 3 - Social Science Requirement³

15

124 Total Semester Hours

¹BIOL 110 and 111 are strongly recommended; however, BIOL 103/105 may substitute for BIOL 110, and BIOL 104/106 may substitute for BIOL 111. The remaining 1-2 credits required must be satisfied by completing 1-2 extra credits from departmental course offerings at the 300 level or above. See advisor.

²At least one lecture and associated laboratory must be completed for both animal diversity (BIOSC 302/306 or BIOSC 303/307) and for plant diversity (BIOSC 304/308, BIOSC 305/309, BIOSC 320, or BIOSC 406, 407).

³See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

⁴At least one lecture course must be completed for both biochemistry (BIOCH 301 or 305) and for genetics (GEN 300 or 302).

⁵BIOSC 434 may be substituted for CH 228.

⁶See advisor. Select one lecture/lab combination from each of the following fields:

Ecology—BIOSC 441/445, 443/444, 446/447, 470/471

Physiology—BIOSC 316, 401/402, 459/460, 475/476

The remaining courses may be selected from EX ST 301, MTHSC 203, 301, or any BIOCH, BIOSC, BOT, GEN or MICRO courses at the 300 level or higher.

ENTOMOLOGY EMPHASIS AREA

See Bachelor of Science curriculum for freshman year requirements.

Sophomore Year**First Semester**

- 3 - CH 223 Organic Chemistry and
- 1 - CH 227 Organic Chemistry Lab. or
- 4 - CH 201 Survey of Organic Chemistry
- 4 - ENT (BIOSC) 301 Insect Biol. and Diversity
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - Biochemistry or Genetics Requirement²

14

Second Semester

- 3 - CH 224 Organic Chemistry and
- 1 - CH 228 Organic Chemistry Laboratory³ or
- 4 - Major Requirement⁴
- 3 - Biochemistry or Genetics Requirement²
- 5 - Major Requirement⁴
- 4 - Plant Diversity Requirement⁵

16

Junior Year**First Semester**

- 3 - BIOSC 335 Evolutionary Biology
- 3 - ENGL 315 Scientific Writing and Comm.
- 3 - PHYS 207 General Physics I and
- 1 - PHYS 209 General Physics I Lab. or
- 3 - PHYS 122 Physics with Calculus I and
- 1 - PHYS 124 Physics Lab. I
- 4 - Entomology Requirement⁶

14

Second Semester

- 3 - PHYS 208 General Physics II and
- 1 - PHYS 210 General Physics II Lab. or
- 3 - PHYS 221 Physics with Calculus II and
- 1 - PHYS 223 Physics Lab. II
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 3 - Entomology Requirement⁶
- 3 - Major Requirement⁴
- 3 - Social Science Requirement¹

16

Senior Year**First Semester**

- 3 - BIOSC 461 Cell Biology
- 2 - BIOSC 462 Cell Biology Lab.
- 2 - BIOSC 493 Senior Seminar
- 4 - Entomology Requirement⁶
- 4 - Major Requirement⁴

15

Second Semester

- 3 - Entomology Requirement⁶
- 9 - Major Requirement⁴
- 3 - Social Science Requirement¹

15

124 Total Semester Hours

¹See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

²At least one lecture course must be completed for both biochemistry (BIOCH 301 or 305) and for genetics (GEN 300 or 302).

³BIOSC 434 may be substituted for CH 228.

⁴See advisor. Select one lecture/lab combination from each of the following fields. BIOSC 475 and 476 are recommended to satisfy the Physiology Requirement.

Ecology—BIOSC 441/445, 443/444, 446/447, 470/471

Physiology—BIOSC 316, 401/402, 459/460, 475/476

The remaining courses may be selected from BIOCH 302, EX ST 301, MTHSC 203, 301, or any BIOCH, BIOSC, BOT, GEN or MICRO courses at the 300 level or higher.

⁵At least one lecture course and associated laboratory must be completed for plant diversity (BIOSC 304/308, BIOSC 305/309, BIOSC 320, or BIOSC 406/407).

⁶ENT (BIOSC) 400, (BIOSC) 415, and seven additional credits selected from ENT 300, 308, 401, 404/409, 407, (BIOSC) 436, (BIOSC) 455, (BIOSC, W F B) 469, 490, (GEN) 495, PL PA (ENT) 406.

PREPHARMACY EMPHASIS AREA**Freshman Year****First Semester**

- 3 - BIOL 103 General Biology I¹
- 1 - BIOL 105 General Biology Lab. I¹
- 1 - BIOSC 101 Frontiers in Biology I
- 4 - CH 101 General Chemistry
- 3 - COMM 150 Intro. to Human Communication or
- 3 - COMM 250 Public Speaking
- 4 - MTHSC 106 Calculus of One Variable I

16

Second Semester

- 3 - BIOL 104 General Biology II¹
- 1 - BIOL 106 General Biology Lab. II¹
- 1 - BIOSC 102 Frontiers in Biology II
- 4 - CH 102 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 111 Calculus II for Biologists

16

Sophomore Year**First Semester**

- 3 - CH 223 Organic Chemistry
- 1 - CH 227 Organic Chemistry Lab.
- 4 - Animal or Plant Diversity Requirement²
- 3 - Arts and Humanities (Literature) Requirement³
- 3 - Biochemistry or Genetics Requirement⁴
- 3 - Social Science Requirement³

17

Second Semester

- 3 - CH 224 Organic Chemistry
- 1 - CH 228 Organic Chemistry Lab.
- 4 - MICRO 305 General Microbiology
- 4 - Animal or Plant Diversity Requirement²
- 3 - Biochemistry or Genetics Requirement⁴

15**Junior Year****First Semester**

- 4 - BIOSC 315 Functional Human Anatomy
- 3 - BIOSC 335 Evolutionary Biology
- 3 - ENGL 315 Scientific Writing and Comm.
- 3 - PHYS 207 General Physics I and
- 1 - PHYS 209 General Physics I Lab. or
- 3 - PHYS 122 Physics with Calculus I and
- 1 - PHYS 124 Physics Lab. I

14**Second Semester**

- 3 - PHYS 208 General Physics II and
- 1 - PHYS 210 General Physics II Lab. or
- 3 - PHYS 221 Physics with Calculus II and
- 1 - PHYS 223 Physics Lab. II
- 3 - PSYCH 201 Introduction to Psychology
- 4 - Animal Physiology Requirement⁵
- 3 - Economics Requirement⁶
- 3 - Major Requirement⁷

17**Senior Year****First Semester**

- 3 - BIOSC 461 Cell Biology
- 2 - BIOSC 462 Cell Biology Lab.
- 2 - BIOSC 493 Senior Seminar
- 8 - Major Requirement⁷

15**Second Semester**

- 3 - Arts and Humanities (Non-Lit.) Requirement³
- 11 - Major Requirement⁷

14**124 Total Semester Hours**

¹Pharmacy programs require BIOL 103/105 and 104/106 or equivalent; however, BIOL 110 and 111 may substitute. The additional 1-2 credit hours will be subtracted from Major Requirement credits.

²At least one lecture and associated laboratory must be completed for both animal diversity (BIOSC 302/306 or BIOSC 303/307) and for plant diversity (BIOSC 304/308, BIOSC 305/309, BIOSC 320, or BIOSC 406/407).

³See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

⁴At least one lecture course must be completed for biochemistry (BIOCH 301 or 305) and for genetics (GEN 300 or 302).

⁵BIOSC 316, 459, 460, or 475/476

⁶ECON 200, 211, or 212

⁷See advisor. Select one lecture/lab combination in ecology (BIOSC 441/445, 443/444, 446/447, 470/471). The remaining courses may be selected from BIOCH 302, EX ST 301, MTHSC 203, 301, or any BIOCH, BIOSC, BOT, GEN or MICRO courses at the 300 level or higher.

QUANTITATIVE BIOLOGY EMPHASIS AREA

See Bachelor of Science curriculum for freshman year requirements.

Sophomore Year**First Semester**

- 3 - CH 223 Organic Chemistry and
- 1 - CH 227 Organic Chemistry Lab. or
- 4 - CH 201 Survey of Organic Chemistry
- 4 - Animal or Plant Diversity Requirement¹
- 3 - Biochemistry or Genetics Requirement²
- 3 - Partial Differential Equations Requirement³

14**Second Semester**

- 3 - CH 224 Organic Chemistry and
- 1 - CH 228 Organic Chemistry Laboratory⁴ or
- 4 - Major Requirement⁵
- 3 - EX ST 301 Introductory Statistics I
- 4 - Animal or Plant Diversity Requirement¹
- 3 - Biochemistry or Genetics Requirement²
- 3 - Major Requirement³

17**Junior Year****First Semester**

- 3 - BIOSC 335 Evolutionary Biology
- 3 - ENGL 315 Scientific Writing and Comm.
- 3 - EX ST 311 Introductory Statistics II
- 3 - PHYS 207 General Physics I and
- 1 - PHYS 209 General Physics I Lab. or
- 3 - PHYS 122 Physics with Calculus I and
- 1 - PHYS 124 Physics Lab. I
- 3 - Major Requirement³

16**Second Semester**

- 4 - BIOSC 428 Quantitative Biology
- 3 - BIOSC 461 Cell Biology
- 2 - BIOSC 462 Cell Biology Lab.
- 3 - PHYS 208 General Physics II and
- 1 - PHYS 210 General Physics II Lab. or
- 3 - PHYS 221 Physics with Calculus II and
- 1 - PHYS 223 Physics Lab. II
- 3 - Social Science Requirement⁶

16**Senior Year****First Semester**

- 2 - BIOSC 493 Senior Seminar
- 3 - GEN 440 Bioinformatics
- 3 - Arts and Humanities (Literature) Requirement⁶
- 8 - Major Requirement³

16**Second Semester**

- 1 - BIOSC 491 Undergraduate Research
- 3 - Arts and Humanities (Non-Lit.) Requirement⁶
- 5 - Major Requirement³
- 3 - Social Science Requirement⁶

12**125 Total Semester Hours**

¹At least one lecture and associated laboratory must be completed for both animal diversity (BIOSC 302/306 or BIOSC 303/307) and for plant diversity (BIOSC 304/308, BIOSC 305/309, BIOSC 320, or BIOSC 406/407).

²At least one lecture course must be completed for both biochemistry (BIOCH 301 or 305) and for genetics (GEN 300 or 302).

³See advisor.

⁴BIOSC 434 may be substituted for CH 228.

⁵See advisor. Select one lecture/lab combination from each of the following fields:

Ecology—BIOSC 441, 445, 443, 444, 446/447, 470/471

Physiology—BIOSC 316, 459, 460, 475/476

The remaining courses may be selected from EX ST 301, MTHSC 203, 301, or any BIOCH, BIOSC, BOT, GEN, or MICRO courses at the 300 level or higher.

⁶See General Education Requirements. Six of these credits must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society Requirements.

TOXICOLOGY EMPHASIS AREA

See Bachelor of Science curriculum for freshman year requirements.

Sophomore Year**First Semester**

- 3 - BIOSC 210 Introduction to Toxicology
- 3 - CH 223 Organic Chemistry and
- 1 - CH 227 Organic Chemistry Lab. or
- 4 - CH 201 Survey of Organic Chemistry
- 4 - Animal or Plant Diversity Requirement¹
- 3 - Biochemistry or Genetics Requirement²

14**Second Semester**

- 3 - CH 224 Organic Chemistry and
- 1 - CH 228 Organic Chemistry Laboratory⁴ or
- 4 - Major Requirement⁵
- 4 - Animal or Plant Diversity Requirement¹
- 3 - Biochemistry or Genetics Requirement²
- 5 - Major Requirement³

16**Junior Year****First Semester**

- 3 - BIOSC 335 Evolutionary Biology
- 3 - ENGL 315 Scientific Writing and Comm.
- 3 - ENTOX (ENT) 430 Toxicology
- 3 - PHYS 207 General Physics I and
- 1 - PHYS 209 General Physics I Lab. or
- 3 - PHYS 122 Physics with Calculus I and
- 1 - PHYS 124 Physics Lab. I
- 3 - Major Requirement³

16**Second Semester**

- 3 - PHYS 208 General Physics II and
- 1 - PHYS 210 General Physics II Lab. or
- 3 - PHYS 221 Physics with Calculus II and
- 1 - PHYS 223 Physics Lab. II
- 3 - Arts and Humanities (Literature) Requirement⁶
- 4 - Major Requirement³
- 3 - Social Science Requirement⁶

14

Senior Year**First Semester**

- 3 - BIOSC 461 Cell Biology
 - 2 - BIOSC 462 Cell Biology Lab.
 - 2 - BIOSC 493 Senior Seminar
 - 3 - CH 313 Quantitative Analysis
 - 1 - CH 317 Quantitative Analysis Lab.
 - 3 - Major Requirement⁵
-
- 14

Second Semester

- 3 - CH 413 Chemistry of Aqueous Systems or
 - 3 - ENTOX 421 Chemical Sources and Fate in Environmental Systems
 - 3 - Arts and Humanities (Non-Lit.) Requirement⁶
 - 4 - Major Requirement⁵
 - 3 - Social Science Requirement⁷
 - 3 - Toxicology Requirement⁷
-
- 16

124 Total Semester Hours

¹CH 223/227 and 224 are recommended.

At least one lecture and associated laboratory must be completed for both animal diversity (BIOSC 302/306 or BIOSC 303/307) and for plant diversity (BIOSC 304/308, BIOSC 305/309, BIOSC 320, or BIOSC 406/407).

At least one lecture course must be completed for both biochemistry (BIOCH 301 or 305) and for genetics (GEN 300 or 302).

⁴BIOSC 434 may be substituted for CH 228.

⁵See advisor. Select one lecture/lab combination from each of the following fields. BIOSC 459/460 or 475/476 are recommended to satisfy the Physiology Requirement.

Ecology—BIOSC 441/445, 443/444, 446/447, 470/471

Physiology—BIOSC 316, 401/402, 459/460, 475/476

The remaining courses may be selected from EX ST 301, MTHSC 203, 301, or any BIOCH, BIOSC, BOT, GEN or MICRO courses at the 300 level or higher.

⁶See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

⁷Any 400-level ENTOX course.

Second Semester

- 5 - BIOL 111 Principles of Biology II¹
 - 1 - BIOSC 102 Frontiers in Biology II
 - 4 - CH 102 General Chemistry
 - 3 - ENGL 103 Accelerated Composition
 - 3-4 - Mathematical Sciences Requirement²
-
- 16-17

Sophomore Year**First Semester**

- 4 - CH 201 Survey of Organic Chemistry³
 - 4 - Animal or Plant Diversity Requirement⁴
 - 3 - Biochemistry or Genetics Requirement⁵
 - 4 - Foreign Language Requirement⁶
-
- 15

Second Semester

- 4 - Animal or Plant Diversity Requirement⁴
 - 3 - Biochemistry or Genetics Requirement⁵
 - 4 - Foreign Language Requirement⁶
 - 4 - Major Requirement⁷
-
- 15

Junior Year**First Semester**

- 3 - BIOSC 335 Evolutionary Biology
 - 3 - BIOSC 461 Cell Biology
 - 2 - BIOSC 462 Cell Biology Laboratory
 - 3 - ENGL 315 Scientific Writing and Comm.
 - 3 - Foreign Language Requirement⁸
 - 3 - Minor Requirement⁸
-
- 17

Second Semester

- 3 - Arts and Humanities (Non-Lit.) Requirement⁹
 - 3 - Foreign Language Requirement⁶
 - 3 - Major Requirement⁷
 - 6 - Minor Requirement⁸
-
- 15

Senior Year**First Semester**

- 2 - BIOSC 493 Senior Seminar
 - 3 - PHYS 207 General Physics I
 - 1 - PHYS 209 General Physics I Lab.
 - 3 - Major Requirement⁷
 - 3 - Minor Requirement⁸
 - 3 - Social Science Requirement⁹
-
- 15

Second Semester

- 3 - PHYS 208 General Physics II
 - 1 - PHYS 210 General Physics II Lab.
 - 3 - Arts and Humanities (Literature) Requirement⁹
 - 2 - Major Requirement⁷
 - 3 - Minor Requirement⁸
 - 3 - Social Science Requirement⁹
-
- 15

125-126 Total Semester Hours

BIOL 110 and 111 are strongly recommended; however, BIOL 103/105 may substitute for BIOL 110, and BIOL 104/106 may substitute for BIOL 111. The remaining 1-2 credits required must be satisfied by completing 1-2 extra credits from departmental course offerings at the 300 level or above. See advisor.

EX ST 301, MTHSC 111 or 301

¹CH 223 and 227 may be substituted for CH 201. Most professional health sciences schools require two semesters of organic chemistry with laboratory.

⁴At least one lecture and associated laboratory must be completed for both animal diversity (BIOSC 302/306 or BIOSC 303/307) and for plant diversity (BIOSC 304/308, BIOSC 305/309, BIOSC 320, or BIOSC 406/407).

⁵At least one lecture course must be completed for both biochemistry (BIOCH 301 or 305) and for genetics (GEN 300 or 302).

⁶Four semesters (through 202) in the same modern foreign language are required.

⁷See advisor. Select one lecture course from each of the following fields:

Ecology—BIOSC 441, 443, 446, 470

Physiology—BIOSC 316, 401, 459, 475

The remaining courses must be selected from MICRO 305 or any BIOSC or BOT courses at the 300 level or higher.

⁸See page 61 for approved minors.

⁹See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

PREREHABILITATION SCIENCES EMPHASIS AREA**Freshman Year****First Semester**

- 3 - BIOL 103 General Biology I¹
 - 1 - BIOL 105 General Biology Lab. I¹
 - 1 - BIOSC 101 Frontiers in Biology I
 - 4 - CH 101 General Chemistry
 - 3 - COMM 150 Intro. to Human Communication or
 - 3 - COMM 250 Public Speaking
 - 4 - MTHSC 106 Calculus of One Variable I
-
- 16

Second Semester

- 3 - BIOL 104 General Biology II¹
 - 1 - BIOL 106 General Biology Lab. II¹
 - 1 - BIOSC 102 Frontiers in Biology II
 - 4 - CH 102 General Chemistry
 - 3 - ENGL 103 Accelerated Composition
 - 3 - EX ST 301 Introductory Statistics
-
- 15

Sophomore Year**First Semester**

- 4 - CH 201 Survey of Organic Chemistry
 - 4 - Animal or Plant Diversity Requirement²
 - 3 - Biochemistry or Genetics Requirement³
 - 4 - Foreign Language Requirement⁴
-
- 15

Second Semester

- 4 - Animal or Plant Diversity Requirement²
 - 3 - Biochemistry or Genetics Requirement³
 - 4 - Foreign Language Requirement⁴
 - 6 - Minor Requirement⁵
-
- 17

Junior Year**First Semester**

- 4 - BIOSC 315 Functional Human Anatomy
 - 3 - BIOSC 335 Evolutionary Biology
 - 3 - BIOSC 461 Cell Biology
 - 2 - BIOSC 462 Cell Biology Laboratory
 - 3 - Foreign Language Requirement⁴
-
- 15

BIOLOGICAL SCIENCES**Bachelor of Arts**

The Bachelor of Arts in Biological Sciences provides a strong foundation in biology and is ideal for students desiring a liberal education emphasizing an interdisciplinary approach to a thorough understanding of the life sciences.

Double Major in Biological Sciences/ Science Teaching—Biological Sciences

The Bachelor of Arts Degree in Biological Sciences and Science Teaching—Biological Sciences prepares students for teaching biology on the secondary school level and for graduate studies in any of the life science areas. See page 109 for the curriculum.

Freshman Year**First Semester**

- 5 - BIOL 110 Principles of Biology I¹
 - 1 - BIOSC 101 Frontiers in Biology I
 - 4 - CH 101 General Chemistry
 - 3 - COMM 150 Intro. to Human Communication or
 - 3 - COMM 250 Public Speaking
 - 4 - MTHSC 106 Calculus of One Variable I
-
- 17

Second Semester

- 4 - BIOSC 316 Human Physiology
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 3 - Foreign Language Requirement⁴
- 6 - Minor Requirement⁵

16

Senior Year**First Semester**

- 2 - BIOSC 493 Senior Seminar
- 3 - ENGL 315 Scientific Writing and Comm.
- 3 - PHYS 207 General Physics I
- 1 - PHYS 209 General Physics I Lab.
- 3 - Major Requirement⁷
- 3 - Social Science Requirement⁸

15

Second Semester

- 3 - PHYS 208 General Physics II
- 1 - PHYS 210 General Physics II Lab.
- 3 - Arts and Humanities (Literature) Requirement⁶
- 3 - Major Requirement⁷
- 3 - Minor Requirement⁵
- 3 - Social Science Requirement⁸

16

125 Total Semester Hours

¹Rehabilitation programs require BIOL 103, 105 and 104, 106 or equivalent; however, BIOL 110 and 111 may substitute. The additional 1-2 credit hours will be subtracted from Major Requirement credits.

²At least one lecture and associated laboratory must be completed for both animal diversity (BIOSC 302/306 or BIOSC 303/307) and for plant diversity (BIOSC 304/308, BIOSC 305/309, BIOSC 320, or BIOSC 406/407).

³At least one lecture course must be completed for both biochemistry (BIOCH 301 or 305) and for genetics (GEN 300 or 302).

⁴Four semesters (through 202) in the same modern foreign language are required.

⁵See page 61 for approved minors. Psychology is recommended. The Medical University of South Carolina and other Rehabilitation Sciences programs require PSYCH 201, 340, and 383.

⁶See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

⁷See advisor. Select one lecture course in ecology (BIOSC 441, 443, 446, 470). The remaining course must be selected from MICRO 305 or any BIOSC course at the 300 level or higher. BIOSC 478 or 479 is recommended.

⁸Notes:

1. HLTH 350 is recommended.

2. American Heart Association Basic Life Support for Health Professionals is required.

BIOSYSTEMS ENGINEERING**Bachelor of Science**

The Biosystems Engineering program is administered jointly with the College of Engineering and Science. See page 89 for the curriculum.

ENVIRONMENTAL AND NATURAL RESOURCES**Bachelor of Science**

The Environmental and Natural Resources curriculum produces professionals who have a broad-based knowledge in natural resources and an ability to interact with other resource professionals to provide thoughtful solutions to environmental and natural resource problems. The world is blessed with an abundance of natural resources, but the problems associated with their conservation are immense. Protection of rare and endangered species, preventing and controlling invasions of exotics, protecting old growth forests, restoring degraded ecosystems, and balancing the resource demands of industry and the public are some of the environmental issues which are enmeshed in politicized environments.

Three concentrations are offered within the Environmental and Natural Resources major. The Conservation Biology Concentration is oriented toward students who desire a greater exposure to taxa, their habitats, and their interrelationships. The Natural Resources Management Concentration emphasizes both resource management and negotiation skills. These two concentrations are administered by the Department of Forestry and Natural Resources. The Natural Resource and Economic Policy Concentration provides more in-depth study in economics and policy applications and is administered by the Department of Applied Economics and Statistics.

Graduates in Environmental and Natural Resources are well-prepared for further graduate studies in natural resources and related fields. Potential public sector employers of graduates include federal, state, and municipal resource management agencies, private industries impacting land and water resources, environmental management consulting firms, and various environmental advocacy groups.

Freshman Year**First Semester**

- 3 - BIOL 103 General Biology I
- 1 - BIOL 105 General Biology Lab. I
- 4 - CH 101 General Chemistry¹ or
- 4 - CH 105 Chemistry in Context I
- 1 - E N R 101 Intro. to Env. and Natural Res. I
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 3 - Oral Communications Requirement²

15

Second Semester

- 3 - BIOL 104 General Biology II
- 1 - BIOL 106 General Biology Lab. II
- 4 - CH 102 General Chemistry¹ or
- 4 - CH 106 Chemistry in Context II
- 3 - ENGL 103 Accelerated Composition
- 3 - EX ST 301 Introductory Statistics
- 1 - F N R 102 FNR Freshman Portfolio

15

See advisor. Conservation Biology Concentration students or students planning to take organic chemistry must take CH 101 and CH 102 and must satisfy the General Education Science and Technology in Society Requirement through another course.

See General Education Requirements.

CONSERVATION BIOLOGY CONCENTRATION**Sophomore Year****First Semester**

- 3 - AP EC 257 Natural Resources, Environment, and Economics
- 4 - BIOSC 320 Field Botany and
- 1 - Elective^{or}
- 2 - FOR 205 Dendrology and
- 3 - FOR 221 Forest Biology
- 3 - CH 223 Organic Chemistry
- 4 - E N R 204 Soil Information Systems or
- 4 - CSENV 202 Soils

15

Second Semester

- 3 - GEN 300 Fundamental Genetics
- 3 - W F B (BIOSC) 313 Conservation Biology
- 3 - Arts and Humanities (Literature) Requirement
- 3 - Physical Environment Requirement³
- 3 - Taxonomy/Habitat Requirement

15

Junior Year**First Semester**

- 3 - BIOSC 335 Evolutionary Biology
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 3 - Ecology Requirement⁴
- 3 - Natural Resource Economics Requirement⁵
- 3 - Taxonomy/Habitat Requirement¹

15

Second Semester

- 3 - ENGL 314 Technical Writing
- 3 - E N R 302 Natural Resources Measurements
- 3 - Ecology Requirement⁴
- 3 - Physiology Requirement⁶
- 3 - Taxonomy/Habitat Requirement¹

15

Senior Year**First Semester**

- 3 - FOR (E N R) 434 GIS for Landscape Planning
- 3 - Conservation Policy/Law Requirement⁷
- 3 - Internship, Creative Inquiry or Directed Research Requirement⁸
- 3 - Social Science Requirement¹
- 3 - Taxonomy/Habitat Requirement¹

15

Second Semester

- 3 - E N R (BIOSC) 413 Restoration Ecology
- 3 - E N R 450 Conservation Issues
- 1 - FOR 498 Senior Portfolio or
- 1 - W F B 498 Senior Portfolio
- 6 - Taxonomy/Habitat Requirement¹
- 2 - Elective

15

120 Total Semester Hours

See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

GEOG 106, GEOL 101, or PHYS 240

*AG M 301, BIOSC 302/306, 303/307, 304/308, 305/309, 320, 406/407, 410/411, 417, 442, 464, 468, 472, 477, 486, CSENV 404, ENT (BIOSC) 301, (BIOSC, W F B) 469, FOR 251, 406, GEOL 112, 114, 210, 403, MICRO 403, W F B 300, 418, 440, 462 or 476. At least four of the courses must be laboratories or courses with a required laboratory component.

⁴BIOSC 441, 442, 443, 446, 470, or F N R 466

⁵AP EC 433, (W F B) 475, C R D (AP EC) 357, or FOR 304

⁶AVS 301, BIOSC 401/402, 458, 475, or (AVS) 480

⁷E N R 429, FOR 400, 416, or W F B 430

⁸Internship (F N R 490); Creative Inquiry (F N R 470); Directed Research (W F B 463); or Senior Honors Thesis (F N R H491).

NATURAL RESOURCE AND ECONOMIC POLICY CONCENTRATION

Sophomore Year

First Semester

- 3 - AP EC 257 Natural Resources, Environment, and Economics
- 3 - PO SC 101 American National Government *or* 3 - PO SC 102 Intro. to International Relations
- 3 - Geography Requirement¹
- 3 - Natural Science Requirement² *or* 3 - Minor Requirement
- 3 - Elective
- 15

Second Semester

- 3 - C R D (AP EC) 357 Natural Res. Economics
- 3 - ECON 212 Principles of Macroeconomics
- 3 - Arts and Humanities (Literature) Requirement³
- 3 - Arts and Humanities (Non-Lit.) Requirement³
- 3 - Elective
- 15

Junior Year

First Semester

- 3 - ECON 314 Intermediate Microeconomics
- 3 - E N R 429 Environmental Law and Policy
- 3 - Applied Economics Requirement⁴
- 3 - Natural Science Requirement² *or* 3 - Minor Requirement
- 3 - Elective
- 15

Second Semester

- 3 - AP EC 475 Wildlife Economics
- 3 - EN SP 400 Studies in Environmental Science
- 3 - EX ST 462 Statistics Applied to Economics
- 3 - Macroeconomics Requirement⁵
- 3 - Natural Science Requirement² *or* 3 - Minor Requirement
- 15

Senior Year

First Semester

- 3 - AP EC 457 Nat. Res. Use, Technology and Policy
- 3 - ECON 319 Environmental Economics
- 6 - Applied Economics Requirement⁴ *or* 3 - Applied Economics Requirement⁴ *and* 3 - Minor Requirement
- 3 - Internship, Creative Inquiry or Directed Research Requirement⁶
- 15

Second Semester

- 3 - E N R 450 Conservation Issues
- 6 - Applied Economics Requirement⁴
- 3 - Community Development Requirement⁷
- 3 - Elective *or* 3 - Minor Requirement
- 15

120 Total Semester Hours

¹GEOL 101, 103, or 106

²Select from any BIOSC, CSENV, E N R, EE&S, EN SP, EN TOX, FOR, GEOL or W F B courses numbered 300 or higher.

³See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

⁴Select from any AP EC courses numbered 300 or higher.

⁵ECON 302, 310 or 315

⁶Internship (AP EC 491); Creative Inquiry (AP EC 494); or Directed Research (AGRIC H491 or H492).

⁷C R D 335 or 336 or RS 401 or 459

NATURAL RESOURCES MANAGEMENT CONCENTRATION

Sophomore Year

First Semester

- 4 - F N R 204 Soil Information Systems *or* 4 - CSENV 202 Soils
- 2 - FOR 205 Dendrology
- 3 - FOR 221 Forest Biology
- 3 - W F B 300 Wildlife Biology
- 3 - Arts and Humanities (Literature) Requirement¹
- 15

Second Semester

- 3 - E N R 302 Natural Resources Measurements
- 3 - FOR 206 Forest Ecology
- 3 - W F B 350 Principles of Fish and Wildlife Biol.
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 3 - Social Science Requirement¹
- 15

Junior Year

First Semester

- 3 - AP EC 257 Natural Resources, Environment, and Economics
- 4 - BIOSC 320 Field Botany *or* 3 - BIOSC 406 Intro. Plant Taxonomy *and* 1 - BIOSC 407 Plant Taxonomy Lab.
- 3 - E N R 429 Environmental Law and Policy *or* 3 - FOR 400 Public Relations in Natural Res.
- 3 - Minor Requirement²
- 3 - Elective
- 16

Second Semester

- 3 - C R D (AP EC) 357 Natural Res. Economics
- 3 - GEOL 101 Physical Geology
- 1 - GEOL 103 Physical Geology Lab.
- 3 - W F B (BIOSC) 313 Conservation Biology
- 6 - Minor Requirement²
- 16

Senior Year

First Semester

- 3 - FOR (E N R) 416 Forest Policy and Admin.
- 3 - FOR (E N R) 434 GIS for Landscape Planning
- 3 - Internship, Creative Inquiry or Directed Research Requirement³
- 3 - Minor Requirement²
- 3 - Elective
- 15

Second Semester

- 3 - E N R 450 Conservation Issues
- 3 - ENGL 314 Technical Writing
- 2 - FOR 406 Forested Watershed Management
- 1 - FOR 498 Senior Portfolio *or* 1 - W F B 498 Senior Portfolio
- 3 - W F B 462 Wetland Wildlife Biology
- 3 - Minor Requirement²
- 15

122 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

²A minor is required and must be selected from the following: Biochemistry; Biological Sciences; Chemistry; Crop and Soil Environmental Science; Environmental Science and Policy; Forest Resource Management; Geology; Horticulture; Legal Studies; Microbiology; Natural Resource Economics; Nonprofit Leadership; Park and Protected Area Management; Therapeutic Recreation; Travel and Tourism; Urban Forestry; Wildlife and Fisheries Biology.

³Internship (F N R 490); Creative Inquiry (F N R 470); or Directed Research (W F B 463 or F N R H491).

FOOD SCIENCE

Bachelor of Science

Food Science majors apply principles of basic and applied sciences to the design, creation, manufacture, packaging, distribution, and utilization of safe, nutritious, and enjoyable foods and food products. The curriculum allows flexibility for concentrating in one of two areas.

In the Food Science and Technology Concentration, students may emphasize business, culinary science (one of three national programs that have been approved by the Research Chef's Association as Culinology™), engineering, food packaging, and additional sciences that complement requirements of the Institute of Food Technologists.

The Nutrition and Dietetics Concentration emphasizes nutrition and related areas. It is currently initially accredited by the Commission on Accreditation for Dietetics Education of the American Dietetic Association.

Food processing industries, ingredient manufacturers, and packaging suppliers employ graduates in new food product development, quality assurance, production management, and technical sales. State and federal agencies also need graduates for food safety and regulatory positions. With the Nutrition and Dietetics Concentration, employment opportunities include dietitians, nutritionists, consultants, and food specialists. Placement rates are high for all of these fields, and graduates are also well prepared to pursue graduate study in many areas.

The Department of Food Science and Human Nutrition also offers an accelerated five-year combined bachelor's/master's program that allows students to count up to twelve hours of graduate credit toward both the BS degree in Food Science and the MS degree in Food, Nutrition and Culinary Sciences. Details are available from the Department of Food Science and Human Nutrition or at www.clemson.edu/foodscience.

FOOD SCIENCE AND TECHNOLOGY CONCENTRATION

Freshman Year

First Semester

- 3 - BIOL 103 General Biology I *and*
- 1 - BIOL 105 General Biology Lab. I *or*
- 5 - BIOL 110 Principles of Biology I
- 4 - CH 101 General Chemistry
- 3 - COMM 150 Intro. to Human Communication
- 1 - FD SC 101 Epochs in Man's Struggle for Food
- 3 - MTHSC 102 Intro. to Math. Analysis *or*
- 4 - MTHSC 106 Calculus of One Variable I

15-17

Second Semester

- 3 - BIOL 104 General Biology II *and*
- 1 - BIOL 106 General Biology Lab. II *or*
- 5 - BIOL 111 Principles of Biology II
- 4 - CH 102 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 1 - FD SC 102 Perspectives in Food and Nutrition Sciences
- 1 - FD SC 450 Creative Inquiry
- 3 - PSYCH 201 Introduction to Psychology

16-17

Sophomore Year

First Semester

- 4 - CH 201 Survey of Organic Chemistry *or*
- 3 - CH 223 Organic Chemistry *and*
- 1 - CH 227 Organic Chemistry Lab.
- 1 - FD SC 450 Creative Inquiry
- 3 - PHYS 122 Physics with Calculus I *and*
- 1 - PHYS 124 Physics Lab. I *or*
- 4 - PHYS 200 Introductory Physics *or*
- 3 - PHYS 207 General Physics I *and*
- 1 - PHYS 209 General Physics I Lab.
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - Social Science Requirement²

15

Second Semester

- 3 - BIOCH 305 Essential Elements of Biochem.
- 3 - EX ST 301 Introductory Statistics
- 3 - FD SC 214 Food Resources and Society
- 1 - FD SC 450 Creative Inquiry
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 2 - Elective

15

Junior Year

First Semester

- 1 - FD SC 301 Food Regulations and Policy
- 1 - FD SC 417 Seminar
- 1 - FD SC 450 Creative Inquiry
- 4 - MICRO 305 General Microbiology
- 3 - NUTR 451 Human Nutrition
- 3 - Departmental Requirement¹
- 2 - Emphasis Area Requirement⁴

15

Second Semester

- 3 - ENGL 304 Business Writing *or*
- 3 - ENGL 314 Technical Writing
- 4 - FD SC 410 Food Product Development
- 1 - FD SC 450 Creative Inquiry
- 4 - MICRO 407 Food and Dairy Microbiology
- 3 - Emphasis Area Requirement⁴

15

Senior Year

First Semester

- 3 - FD SC 306 Food Service Operations *or*
- 3 - FD SC 307 Restaurant Food Service Mgt.
- 4 - FD SC 401 Food Chemistry I
- 3 - FD SC 404 Food Preservation and Processing
- 2 - FD SC 407 Quantity Food Production
- 1 - FD SC 450 Creative Inquiry
- 3 - Emphasis Area Requirement⁴

16

Second Semester

- 4 - FD SC 402 Food Chemistry II
- 4 - FD SC 408 Food Process Engineering
- 3 - FD SC (PKGSC) 409 Total Quality Mgt. for the Food and Packaging Industries
- 1 - FD SC 450 Creative Inquiry
- 3 - Emphasis Area Requirement⁴

15

122-125 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

²For students undecided on concentration area, AP EC 202, ECON 211, or 212 is recommended.

³FD SC 430 or AVS 413

⁴See advisor.

NUTRITION AND DIETETICS CONCENTRATION

Freshman Year

First Semester

- 3 - BIOL 103 General Biology I *and*
- 1 - BIOL 105 General Biology Lab. I *or*
- 5 - BIOL 110 Principles of Biology I
- 4 - CH 101 General Chemistry
- 3 - COMM 150 Intro. to Human Communication
- 1 - FD SC 101 Epochs in Man's Struggle for Food
- 3 - MTHSC 102 Intro. to Math. Analysis *or*
- 4 - MTHSC 106 Calculus of One Variable I

15-17

Second Semester

- 3 - BIOL 104 General Biology II *and*
- 1 - BIOL 106 General Biology Lab. II *or*
- 5 - BIOL 111 Principles of Biology II
- 4 - CH 102 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 1 - FD SC 102 Perspectives in Food and Nutrition Sciences
- 3 - PSYCH 201 Introduction to Psychology

15-16

Sophomore Year

First Semester

- 3 - AP EC 202 Agricultural Economics *or*
- 3 - ECON 211 Principles of Microeconomics *or*
- 3 - ECON 212 Principles of Macroeconomics
- 4 - CH 201 Survey of Organic Chemistry *or*
- 3 - CH 223 Organic Chemistry *and*
- 1 - CH 227 Organic Chemistry Lab.
- 1 - NUTR 216 Current Issues in Nutrition
- 3 - PHYS 122 Physics with Calculus I *and*
- 1 - PHYS 124 Physics Lab. I *or*
- 4 - PHYS 200 Introductory Physics *or*
- 3 - PHYS 207 General Physics I *and*
- 1 - PHYS 209 General Physics I Lab.
- 3 - Arts and Humanities (Literature) Requirement¹

15

Second Semester

- 3 - BIOCH 305 Essential Elements of Biochem.
- 3 - EX ST 301 Introductory Statistics
- 3 - FD SC 214 Food Resources and Society
- 1 - FD SC 450 Creative Inquiry
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 2 - Elective

15

Junior Year

First Semester

- 4 - BIOSC 222 Human Anatomy and Phys. I
- 1 - FD SC 301 Food Regulations and Policy
- 1 - FD SC 450 Creative Inquiry
- 4 - MICRO 305 General Microbiology
- 3 - NUTR 451 Human Nutrition
- 2 - Elective

15

Second Semester

- 4 - BIOSC 223 Human Anatomy and Phys. II
- 3 - ENGL 304 Business Writing *or*
- 3 - ENGL 314 Technical Writing
- 1 - FD SC 450 Creative Inquiry
- 4 - MICRO 407 Food and Dairy Microbiology
- 3 - NUTR 455 Nutrition and Metabolism

15

Senior Year

First Semester

- 3 - FD SC 306 Food Service Operations
- 4 - FD SC 401 Food Chemistry I
- 3 - FD SC 404 Food Preservation and Processing
- 2 - FD SC 407 Quantity Food Production
- 1 - NUTR 418 Professional Devel. in Dietetics *or*
- 1 - NUTR 419 Professional Devel. in Nutrition
- 4 - NUTR 424 Medical Nutrition Therapy I

17

Second Semester

- 4 - FD SC 402 Food Chemistry II
- 3 - FD SC (PKGSC) 409 Total Quality Mgt. for the Food and Packaging Industries
- 1 - FD SC 450 Creative Inquiry
- 4 - NUTR 425 Medical Nutrition Therapy II
- 3 - NUTR 426 Community Nutrition

15

122-125 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

²NUTR 419 is recommended for students not pursuing registered dietitian (RD) status.

FOREST RESOURCE MANAGEMENT

Bachelor of Science

The Forest Resource Management curriculum combines a broad education in the arts and sciences with applied forest sciences. This combination provides the necessary foundation for the scientific management of forest resources, products, and services.

Foresters are qualified for a broad spectrum of employment opportunities in the public and private sectors. They may be engaged as managers, administrators, or owners of forest lands or forest-based businesses; as technical specialists in the production of timber, usable water, wildlife, and aesthetic values, and in the recreational use of the forest; or as professionals in other areas where the conservation of natural resources is a concern. Foresters earning advanced degrees find employment in academic work and in research conducted by public and private agencies.

The curriculum, accredited by the Society of American Foresters, provides a strong program in the basic knowledge and skills required of a professional forester. Forest Resource Management majors will select a minor (see page 61). The curriculum also provides the necessary prerequisites for graduate study.

For students interested in conservation biology, water, and natural resources, the Department of Forestry and Natural Resources also administers the Conservation Biology Concentration and the Natural Resources Management Concentration within the Environmental and Natural Resources degree program. See pages 49-50 for program details.

Freshman Year

First Semester

- 3 - BIOL 103 General Biology I
- 1 - BIOL 105 General Biology Lab. I
- 4 - CH 105 Chemistry in Context I¹
- 1 - E N R 101 Intro. to Environ. and Natural Res. I
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 3 - Oral Communication Requirement²

15

Second Semester

- 3 - BIOL 104 General Biology II
- 1 - BIOL 106 General Biology Lab. II
- 3 - ENGL 103 Accelerated Composition
- 3 - EX ST 301 Introductory Statistics
- 1 - F N R 102 FNR Freshman Portfolio
- 4 - Departmental Science Requirement³

15

Sophomore Year

First Semester

- 4 - F N R 204 Soil Information Systems
- 2 - FOR 205 Dendrology
- 3 - FOR 221 Forest Biology
- 3 - Arts and Humanities (Literature) Requirement²
- 3 - Economics Requirement⁴

15

Second Semester

- 3 - ENGL 314 Technical Writing
- 3 - FOR 206 Forestry Ecology
- 3 - Arts and Humanities (Non-Lit.) Requirement²
- 3 - Social Science Requirement²
- 3 - Minor Requirement⁵

15

Forestry Summer Camp

- 2 - FOR 251 Forest Communities
- 1 - FOR 252 Forest Operations
- 4 - FOR 253 Forest Mensuration
- 1 - FOR 254 Forest Products

8

Junior Year

First Semester

- 2 - FOR 302 Forest Biometrics
- 3 - FOR 304 Forest Resource Economics
- 3 - FOR 341 Wood Procurement Practices in the Forest Industry
- 4 - FOR 413 Integrated Forest Pest Management
- 3 - FOR (E N R) 434 GIS for Landscape Planning
- 1 - Internship, Creative Inquiry or Directed Research Requirement⁶

16

Second Semester

- 2 - FOR 308 Remote Sensing in Forestry
- 3 - FOR 408 Wood and Paper Products
- 3 - FOR 418 Forest Resource Valuation
- 4 - FOR 465 Silviculture
- 3 - Minor Requirement⁵
- 1 - Internship, Creative Inquiry or Directed Research Requirement⁶

16

Senior Year

First Semester

- 4 - FOR 410 Harvesting Processes
- 3 - FOR (E N R) 416 Forest Policy and Admin.
- 3 - FOR 417 Forest Resource Mgt. and Regulation
- 2 - FOR 431 Recreation Resource Planning in Forest Management
- 3 - Minor Requirement⁵
- 1 - Internship, Creative Inquiry or Directed Research Requirement⁶

16

Second Semester

- 1 - F N R 499 Natural Resources Seminar
- 2 - FOR 406 Forested Watershed Management
- 3 - FOR 415 Forest Wildlife Management
- 2 - FOR 425 Forest Resource Management Plans
- 1 - FOR 498 Senior Portfolio
- 6 - Minor Requirement⁵

15

131 Total Semester Hours

¹CH 101 may be substituted; however, students selecting this option may be required to use elective hours to satisfy the General Education Science and Technology in Society Requirement.

²See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement. (Note: Social Science Requirement must be in an area other than economics or applied economics.)

³See advisor.

⁴AP EC 257, ECON 200, 211, or 212

⁵To be selected by the middle of the sophomore year

⁶F N R 470, 490, or FOR 419

LAND SURVEYING EMPHASIS AREA

Freshman Year

First Semester

- 3 - BIOL 103 General Biology I
- 1 - BIOL 105 General Biology Lab. I
- 4 - CH 105 Chemistry in Context I
- 1 - E N R 101 Intro. to Environ. and Natural Res. I
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 3 - Oral Communication Requirement¹

15

Second Semester

- 3 - BIOL 104 General Biology II
- 1 - BIOL 106 General Biology Lab. II
- 3 - ENGL 103 Accelerated Composition
- 3 - EX ST 301 Introductory Statistics
- 1 - F N R 102 FNR Freshman Portfolio
- 4 - Departmental Science Requirement²

15

Sophomore Year

First Semester

- 4 - F N R 204 Soil Information Systems
- 2 - FOR 205 Dendrology
- 3 - FOR 221 Forest Biology
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - Economics Requirement³

15

Second Semester

- 2 - E G 210 Engineering Graphics for Civil Engr.
- 3 - ENGL 314 Technical Writing
- 3 - FOR 206 Forestry Ecology
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 3 - Social Science Requirement¹

14

Forestry Summer Camp

- 2 - FOR 251 Forest Communities
- 1 - FOR 252 Forest Operations
- 4 - FOR 253 Forest Mensuration
- 1 - FOR 254 Forest Products

8

Junior Year

First Semester

- 2 - FOR 302 Forest Biometrics
- 3 - FOR 304 Forest Resource Economics
- 3 - FOR 341 Wood Procurement Practices in the Forest Industry
- 4 - FOR 413 Integrated Forest Pest Management
- 3 - FOR (E N R) 434 GIS for Landscape Planning

15

Second Semester

- 3 - AG M 221 Surveying: Earthwork and Area Measurements
- 2 - FOR 308 Remote Sensing in Forestry
- 3 - FOR 408 Wood and Paper Products
- 3 - FOR 418 Forest Resource Valuation
- 4 - FOR 465 Silviculture

15

Summer

- 3 - F N R 490 Field Training in Natural Resources⁴

Senior Year

First Semester

- 4 - FOR 410 Harvesting Processes
- 3 - FOR (E N R) 416 Forest Policy and Admin.
- 3 - FOR 417 Forest Resource Mgt. and Regulation
- 2 - FOR 431 Rec. Resource Plan. in Forest Mgt.
- 3 - FOR 433 GPS Applications

15

Second Semester

- 3 - B E 322 Small Watershed Hydrology and Sedimentology
- 1 - F N R 499 Natural Resources Seminar
- 2 - FOR 406 Forested Watershed Management
- 2 - FOR 415 Forest Wildlife Management
- 2 - FOR 425 Forest Resource Management Plans
- 1 - FOR 498 Senior Portfolio
- 3 - LAW 333 Real Estate Law

15

130 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement. (Note: Social Science Requirement must be in an area other than economics or applied economics.)

²See advisor.

³AP EC 257, ECON 200, 211, or 212

⁴Summer internship must be in land surveying.

GENETICS

Bachelor of Science

Genetics is the study of heredity. Genetics research takes many forms, from the study of heredity at the level of individual molecules to study at the level of cells and chromosomes, individuals, or populations. To comprehend current genetic information and to make future contributions to our molecular understanding of life processes, students must obtain a broad background in biology and a firm foundation in chemistry and mathematics. This is the basis of the genetics curriculum.

A degree in Genetics is a strong preparation for many careers. The degree provides an excellent foundation for medical, veterinary, or pharmacy school, as well as graduate research in any discipline related to biology, including bioinformatics, forensic technology, and genetic counseling. Because of the increasing emphasis on genetics in everyday life, a Bachelor of Science in Genetics can also be a direct path to a career in the emerging biotechnology industries (pharmaceuticals, agricultural technologies, biomimetic minerals) in research, sales, or business operations. Combined with a law degree, a genetics bachelor of science is a good background for a career as a patent attorney.

Freshman Year

First Semester

- 5 - BIOL 110 Principles of Biology I
- 4 - CH 101 General Chemistry
- 1 - GEN 103 Careers in Biochem. and Genetics
- 4 - MTHSC 106 Calculus of One Variable I

14

Second Semester

- 5 - BIOL 111 Principles of Biology II
- 4 - CH 102 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 108 Calculus of One Variable II

16

Sophomore Year

First Semester

- 3 - CH 223 Organic Chemistry
- 1 - CH 227 Organic Chemistry Lab.
- 3 - COMM 150 Intro. to Human Comm. or
3 - COMM 250 Public Speaking
- 3 - GEN 302 Molecular and General Genetics
- 3 - PHYS 122 Physics with Calculus I¹
- 1 - PHYS 124 Physics Lab. I¹

14

Second Semester

- 3 - BIOCH 301 Molecular Biochemistry
- 2 - BIOCH 302 Molecular Biochemistry Lab.
- 3 - CH 224 Organic Chemistry
- 1 - CH 228 Organic Chemistry Lab.
- 3 - EX ST 301 Introductory Statistics
- 3 - Arts and Humanities (Literature) Requirement²
- 3 - Social Science Requirement²

18

Junior Year

First Semester

- 3 - BIOSC 461 Cell Biology
- 3 - GEN 410 Fundamentals of Genetics I
- 2 - GEN 411 Fundamentals of Genetics II Lab.
- 3 - Science Requirement³
- 3 - Elective⁴

14

Second Semester

- 3 - GEN 420 Fundamentals of Genetics II
- 2 - GEN 421 Fundamentals of Genetics II Lab.
- 3 - GEN (BIOCH) 440 Bioinformatics
- 3 - PHIL 326 Science and Values
- 3 - Genetics Requirement⁵
- 3 - Elective⁴

17

Senior Year

First Semester

- 3 - GEN 450 Comparative Genetics
- 3 - Science Requirement¹
- 3 - Social Science Requirement¹
- 6 - Elective⁴

15

Second Semester

- 2 - GEN 493 Senior Seminar
- 6 - Genetics Requirement¹
- 3 - Science Requirement¹
- 4 - Elective⁴

15

123 Total Semester Hours

¹Medical, veterinary, and graduate school requirements often include two semesters of physics with calculus and the physics laboratory. Students are encouraged to check requirements for admission to professional postgraduate programs.

²See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

³BIOSC 222, 223, PHYS 221, 223, or any courses at 300 level or above in BIOCH, BIO E, BIOSC, CH, EX ST, GEN, MTHSC, MICRO, and PHYS. A maximum of three credit hours may be selected from undergraduate research courses (491, creative inquiry, or similar courses). Other courses must be approved by advisor.

⁴Two semesters of a foreign language are strongly recommended.

⁵AVS 470, BIOCH 436, BIOSC 335, 440, 450, 454, 456, 457, CSENV 405, GEN 470, HORT (BIOSC, GEN) 465, MICRO 415

Notes:

1. A student is allowed to enroll in science and mathematics courses only when all prerequisites have been passed with a grade of C or better.

2. A minimum grade of C is required in all science and mathematics courses. No student may exceed a maximum of two attempts, excluding a 'W', to complete successfully any science or mathematics course.

HORTICULTURE

Bachelor of Science

Horticulture connects plants and people to improve our world, be it through the enhancement of the foods we eat, the creation of healthy natural living spaces, the economic and aesthetic enhancement of our homes and communities, or the application of green solutions to the challenges of environmental quality. The plants of horticulture are the foundation of human and environmental well being, and it is horticulture professionals who have the knowledge, skills, and passion to utilize those plants for the betterment of humankind.

The Horticulture degree program includes courses in science, mathematics, business, leadership, law, and communication, combined with a strong foundation in horticultural sciences and arts. The curriculum provides the flexibility to choose courses within those categories that best support the student's personal interests, goals, and success. Career opportunities are endless.

Students work closely with faculty in creative inquiry groups to investigate and implement solutions to real problems. Internships are excellent opportunities to learn and explore potential careers.

Freshman Year**First Semester**

- 3 - BIOL 103 General Biology 1
 - 1 - BIOL 105 General Biology Lab. 1
 - 4 - CH 101 General Chemistry¹ or
 - 4 - CH 105 Chemistry in Context¹
 - 3 - HORT 101 Horticulture
 - 4 - Spanish Language Requirement²
- 15

Second Semester

- 4 - CH 102 General Chemistry¹ or
 - 4 - CH 106 Chemistry in Context¹
 - 3 - ENGL 103 Accelerated Composition
 - 1 - HORT 102 Experience Horticulture
 - 3 - MTHSC 102 Intro. to Mathematical Analysis
 - 4 - Related Science Requirement²
- 15

Sophomore Year**First Semester**

- 3 - HORT 303 Landscape Plants
 - 3 - MTHSC 101 Essential Math. for Informed Soc.
 - 3 - Arts and Humanities (Non-Lit.) Requirement³
 - 3 - Business Requirement²
 - 4 - Plant Biology Requirement²
- 16

Second Semester

- 3 - HORT 305 Plant Propagation
 - 1 - HORT 306 Plant Propagation Techniques Lab.
 - 3 - Arts and Humanities (Literature) Requirement³
 - 3 - Horticulture Specialization Requirement²
 - 3 - Social Science Requirement³
- 13

Summer

- 3 - HORT 271 Internship⁴ or
- 3 - HORT 471 Advanced Internship⁴

Junior Year**First Semester**

- 4 - CSENV 202 Soils
 - 3 - Horticulture Specialization Requirement²
 - 3 - Oral Communication Requirement³
 - 3 - Social Science Requirement³
 - 3 - Elective
- 16

Second Semester

- 3 - BIOSC 401 Plant Physiology
 - 1 - BIOSC 402 Plant Physiology Lab.
 - 1 - HORT 409 Seminar
 - 3 - Business Requirement²
 - 3 - Horticulture Specialization Requirement²
 - 3 - Related Science Requirement²
- 14

Senior Year**First Semester**

- 3 - Business Requirement²
 - 6 - Horticulture Specialization Requirement²
 - 6 - Related Science Requirement²
- 15

Second Semester

- 6 - Horticulture Specialization Requirement²
 - 6 - Related Science Requirement²
 - 1 - Elective
- 13

120 Total Semester Hours

¹Students not taking the CH 105/106 sequence must satisfy the General Education Science and Technology in Society Requirement by selecting a qualifying course from the Related Science Requirement.

²See advisor. Select from department-approved list.

³See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

⁴Internship must be completed in one or two semesters. Internship may be done fall, spring, or summer after completing HORT 303. Prior approval is required for internships, and a 2.0 grade-point ratio is required for registration.

Note: Horticulture majors must make a C or better in all HORT-designated courses. Courses may be repeated as often as necessary to achieve the minimum grade.

MICROBIOLOGY**Bachelor of Science**

Microbiology deals with the study of bacteria, viruses, yeasts, filamentous fungi, protozoa, and unicellular algae. Microbiologists seek to describe these organisms in terms of their structures, functions, and processes of reproduction, growth, and death at both the cellular and molecular levels. They are also concerned with their ecology, particularly in regard to their pathological effects on man, and with their economic importance.

The Microbiology major provides a thorough training in the basic microbiological skills. Further, students receive instruction in mathematics, physics, chemistry, and biochemistry, all essential to the training of a modern microbiologist. Students can prepare for a variety of careers through a wide choice of electives. The Microbiology curriculum with a Biomedicine Concentration is recommended for students planning postgraduate programs. Microbiology graduates may enter graduate school in microbiology, biochemistry, bioengineering, or related disciplines; they may enter medical or dental schools or pursue careers in one of the many industries or public service departments dependent upon microbiology. Some of these are the fermentation and drug industries, medical and public health microbiology, various food industries, and agriculture.

Microbiology majors planning to apply for admission to a medical or dental school should inform their advisors immediately upon entering the program.

Freshman Year**First Semester**

- 5 - BIOL 110 Principles of Biology I¹
 - 4 - CH 101 General Chemistry
 - 3 - COMM 150 Intro. to Human Communication or
 - 3 - COMM 250 Public Speaking
 - 1 - MICRO 101 Microbes and Human Affairs
 - 4 - MTHSC 106 Calculus of One Variable 1
- 17

Second Semester

- 5 - BIOL 111 Principles of Biology II¹
 - 4 - CH 102 General Chemistry
 - 3 - ENGL 103 Accelerated Composition
 - 3.4 - Mathematics Requirement²
- 15-16

Sophomore Year**First Semester**

- 3 - CH 223 Organic Chemistry
 - 1 - CH 227 Organic Chemistry Lab.
 - 4 - MICRO 305 General Microbiology
 - 3 - Arts and Humanities (Literature) Requirement³
 - 3 - Social Science Requirement³
 - 3 - Elective⁴
- 17

Second Semester

- 2 - BIOSC 434 Biol. Chemistry Lab. Techniques
 - 3 - CH 224 Organic Chemistry
 - 1 - CH 228 Organic Chemistry Lab.
 - 3 - Arts and Humanities (Non-Lit.) Requirement³
 - 3 - Biochemistry Requirement⁵
 - 3 - Microbiology Requirement⁶
- 15

Junior Year**First Semester**

- 3 - BIOSC 461 Cell Biology
 - 4 - MICRO 401 Microbial Diversity and Ecology
 - 3 - PHYS 207 General Physics I and
 - 1 - PHYS 209 General Physics I Lab. or
 - 3 - PHYS 122 Physics with Calculus I and
 - 1 - PHYS 124 Physics Lab. I
 - 3 - Microbiology Requirement⁶
- 14

Second Semester

- 3 - ENGL 315 Scientific Writing and Comm.
 - 4 - MICRO 412 Bacterial Physiology
 - 3 - Microbiology Requirement⁶
 - 3 - Virology Requirement⁷
 - 3.4 - Elective^{4,8}
- 16-17

Senior Year**First Semester**

- 4 - MICRO 415 Microbial Genetics
 - 4 - Microbiology Requirement⁶
 - 3 - Social Science Requirement³
 - 4 - Elective⁴
- 15

Second Semester

- 2 - BIOSC 493 Senior Seminar
 - 4 - Microbiology Requirement⁶
 - 9 - Elective⁴
- 15

124-126 Total Semester Hours

¹BIOL 110 and 111 are strongly recommended; however, BIOL 103/105 may substitute for BIOL 110, and BIOL 104/106 may substitute for BIOL 111. The remaining 1-2 credits required must be satisfied by completing 1-2 extra credits from departmental course offerings at the 300 level or higher. See advisor.

²MTHSC 111, 203, 301, or EX ST 301

¹See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

⁴Elective hours may be used toward satisfying the requirements of a minor.

⁵BIOCH 301 or 305

⁶See advisor. Minimum of 17 credits is required. At least one course must be selected from each of the following fields:

Biomedicine—BIOSC 420, 434, 456/457, 467, 484, 489, GEN 300, HLTH 380, MICRO 400, 411, (AVS, BIOSC) 414, 417

Environmental—BIOSC (PL PA) 425, MICRO 402, 403, 410

Food Safety, Industrial, and Technology—BIOSC 487, GEN (BIOSC, MICRO) 418, MICRO 407, 413

⁷BIOSC 454 or MICRO 416

⁸Students planning on applying to medical/dental schools should take PHYS 208 and 210 during the second semester of the junior year.

BIOMEDICINE CONCENTRATION

Freshman Year

First Semester

- 5 - BIOL 110 Principles of Biology I¹
 - 4 - CH 101 General Chemistry
 - 3 - COMM 150 Intro. to Human Communication *or*
3 - COMM 250 Public Speaking
 - 1 - MICRO 101 Microbes and Human Affairs
 - 4 - MTHSC 106 Calculus of One Variable I
-
- 17

Second Semester

- 5 - BIOL 111 Principles of Biology II¹ *or*
4 - BIOSC 315 Functional Human Anatomy
 - 4 - CH 102 General Chemistry
 - 3 - ENGL 103 Accelerated Composition
 - 3 - Mathematics Requirement²
-
- 14-16

Sophomore Year

First Semester

- 3 - CH 223 Organic Chemistry
 - 1 - CH 227 Organic Chemistry Lab.
 - 4 - MICRO 305 General Microbiology
 - 3 - Arts and Humanities (Literature) Requirement³
 - 4 - Elective
-
- 15

Second Semester

- 3 - CH 224 Organic Chemistry
 - 1 - CH 228 Organic Chemistry Lab.
 - 3 - Arts and Humanities (Non-Lit.) Requirement³
 - 3 - Biochemistry Requirement⁴
 - 3 - Biomedicine Requirement⁵
 - 3 - Social Science Requirement⁶
-
- 16

Junior Year

First Semester

- 3 - GEN 300 Fundamental Genetics
 - 4 - MICRO 401 Microbial Diversity and Ecology
 - 4 - MICRO (AVS, BIOSC) 414 Basic Immunology
 - 3 - PHYS 207 General Physics I and
3 - PHYS 209 General Physics I Lab. *or*
3 - PHYS 122 Physics with Calculus I and
1 - PHYS 124 Physics Lab. I
-
- 15

Second Semester

- 3 - ENGL 315 Scientific Writing and Comm.
 - 4 - MICRO 412 Bacterial Physiology
 - 3 - PHYS 208 General Physics II and
1 - PHYS 210 General Physics II Lab. *or*
3 - PHYS 221 Physics with Calculus II and
1 - PHYS 223 Physics Lab. II
 - 4 - Elective
-
- 15

Senior Year

First Semester

- 3 - BIOSC 461 Cell Biology
 - 2 - BIOSC 462 Cell Biology Lab.
 - 4 - MICRO 415 Microbial Genetics
 - 3 - MICRO 416 Introductory Virology
 - 3 - Social Science Requirement⁷
-
- 15

Second Semester

- 4 - MICRO 411 Pathogenic Bacteriology
 - 3 - MICRO 417 Molecular Mechanisms of
Carcinogenesis and Aging
 - 2 - MICRO 493 Senior Seminar
 - 3 - Biomedicine Requirement⁸
 - 3 - Elective
-
- 15

122–124 Total Semester Hours

¹BIOL 110 and 111 are strongly recommended; however, BIOL 103/105 may substitute for BIOL 110, and BIOL 104/106 may substitute for BIOL 111. The remaining 1–2 credits required must be satisfied by completing 1–2 extra credits from departmental course offerings at the 300 level or higher. See advisor.

²MTHSC 111, 203, 301, or EX ST 301

³See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

⁴BIOCH 301 or 305.

⁵BIOCH 423, 432, BIOSC 420, (PL PA) 425, 434, 456, 457, 467, 484, 489, HLTH 380, MICRO 400 *or* 491.

PACKAGING SCIENCE

Bachelor of Science

The Bachelor of Science degree in Packaging Science prepares students for careers in industries producing and utilizing packages for all types of products. Packaging is an essential part of industrialized economies, protecting, preserving, and helping to market products. The field of packaging is highly competitive and highly innovative, requiring an ever-increasing number of professional positions.

Opportunities for employment include a wide variety of career paths such as manufacturing, marketing, sales, design, purchasing, quality assurance, and customer services. Most career opportunities are in positions requiring technical knowledge combined with marketing and management skills.

The core curriculum assures graduates of having the skills and knowledge required by most entry-level packaging positions. Emphasis area choices or approved minors allow students to select courses to improve career preparation for specific industry segments, including distribution and transportation, engineering technology, food and health care

packaging, package design and graphics, materials, international packaging, marketing/finance, business administration, entrepreneurship, environmental engineering, environmental science and policy, and management.

Students changing majors to Packaging Science must have at least a 2.0 cumulative grade-point ratio.

Freshman Year

First Semester

- 3 - BIOL 103 General Biology I
 - 1 - BIOL 105 General Biology Lab. I
 - 4 - CH 101 General Chemistry
 - 4 - MTHSC 106 Calculus of One Variable I
 - 1 - PKGSC 101 Packaging Orientation¹
 - 3 - Social Science Requirement²
-
- 16

Second Semester

- 3 - BIOL 104 General Biology II
 - 1 - BIOL 106 General Biology Lab. II
 - 4 - CH 102 General Chemistry
 - 3 - ENGL 103 Accelerated Composition
 - 2 - PKGSC 102 Intro. to Packaging Science¹
 - 1 - PKGSC 103 Packaging Science ePortfolio
-
- 14

Sophomore Year

First Semester³

- 4 - CH 201 Survey of Organic Chemistry *or*
3 - CH 223 Organic Chemistry and
1 - CH 227 Organic Chemistry Lab.
 - 3 - PHYS 207 General Physics I and
1 - PHYS 209 General Physics I Lab. *or*
3 - PHYS 122 Physics with Calculus I and
1 - PHYS 124 Physics Lab. II
 - 4 - PKGSC 202 Packaging Materials and Manuf.⁴
 - 2 - PKGSC 203 Packaging Research Fundamentals
-
- 14

Second Semester³

- 4 - G C 103 Graphic Comm. I for Packaging Sci.
 - 3 - PHYS 208 General Physics II and
1 - PHYS 210 General Physics II Lab. *or*
3 - PHYS 221 Physics with Calculus II and
1 - PHYS 223 Physics Lab. II
 - 3 - PKGSC 201 Packaging Perishable Products
 - 3 - PKGSC 204 Container Systems¹
 - 1 - PKGSC 206 Container Systems Lab.¹
 - 2 - PKGSC 220 Package Drawing/CAD
-
- 17

Summer

- 0 - CO-OP 101 Cooperative Education⁴

Junior Year

First Semester

- 3 - PKGSC 320 Package Design Fundamentals
 - 3 - PKGSC 368 Packaging and Society
 - 3 - PKGSC 404 Mechanical Properties of Packages and Principles of Protective Packaging⁵
 - 3 - PKGSC 430 Converting for Flexible Packaging
 - 1 - PKGSC 454 Product and Package Eval. Lab.⁵
 - 3 - Emphasis Area Requirement⁶
-
- 16

Second Semester

- 3 - COMM 250 Public Speaking
- 3 - PKGSC 401 Packaging Machinery
- 3 - PKGSC 440 Packaging for Distribution
- 3 - Arts and Humanities (Literature) Requirement²
- 3 - Emphasis Area Requirement⁶

15

Senior Year**First Semester**

- 3 - EX ST 301 Introductory Statistics
- 4 - PKGSC 416 Appl. of Polymers in Packaging
- 4 - PKGSC 464 Food and Health Care Pkg. Syst.
- 3 - Emphasis Area Requirement⁶

14

Second Semester

- 3 - AP EC 202 Agricultural Economics *or*
- 3 - ECON 211 Principles of Microeconomics
- 1 - PKGSC 403 Packaging Career Preparation
- 3 - PKGSC 420 Package Design and Development
- 3 - Arts and Humanities (Non-Lit.) Requirement²
- 6 - Emphasis Area Requirement⁶

16

122 Total Semester Hours

¹A C or better is required in this course for graduation.²See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement. *Note:* Social Science Requirement must be in an area other than economics or applied economics. A 200-level or higher foreign language course is recommended to satisfy the Arts and Humanities (Non-Literature) Requirement.³Students interested in minors or emphasis areas should take any prerequisites in the sophomore year.⁴At least one 15-week period (six months preferred) of Cooperative Education is required.⁵PKGSC 404 and 454 must be taken concurrently.⁶Completion of an approved minor or emphasis area is required. Approved minors are Business Administration, Entrepreneurship, Environmental Engineering, Environmental Science and Policy, and Management. Emphasis Areas consist of 15 credit hours selected from one of the following areas: Distribution and Transportation, Engineering and Technology, Food and Health Care Packaging, Package Design and Graphics, Materials, International Packaging, and Marketing/Finance. See advisor for approved emphasis area courses.**PREPROFESSIONAL HEALTH STUDIES****Non-degree**

The health professions need individuals with a diversity of educational backgrounds and a wide variety of talents and interests. The philosophies of education, the specific preprofessional course requirements, the noncognitive qualifications for enrollment, and the systems of training vary among the professional health schools; but all recognize the desirability of a broad education—a good foundation in the natural sciences, highly developed communication skills, and a solid background in the humanities and social sciences. The absolute requirements for admission to professional health schools are limited to allow latitude for developing individualized undergraduate programs of study; however, most schools of medicine and dentistry require 16 semester hours of chemistry, including organic chemistry, eight hours of biological sciences, eight hours of physics, and six hours of mathematics. These requirements should be balanced with courses in vocabulary building, the humanities,

and social sciences. The basic requirements in the natural sciences and as many of the courses in the humanities and social sciences as possible should be completed by the third year so students are prepared to take the Dental Admission Test or the Medical College Admission Test prior to applying to a professional school.

Undergraduates may also prepare to study optometry, podiatry, and other health professions. While the basic requirements for these professional schools are essentially the same as those for schools of medicine and dentistry, specific requirements for individual schools in these professions vary somewhat; consequently, interested students are advised to consult with the chief health professionals advisor.

At Clemson, rather than having a separate, organized preprofessional health studies program, students are allowed to major in any curriculum, as long as the basic entrance requirements of the professional health school are fulfilled. These schools are not as concerned about a student's major as they are about academic performance in whichever curriculum the student chooses. Professional health schools have neither preferences nor prejudices concerning any curriculum, which is evidenced by the fact that their entering students represent a broad spectrum of curricula. The emphasis is placed on the student's doing well in the curriculum chosen, and this becomes critical as competition increases for the limited number of places available in professional health schools.

PREPHARMACY

The two-year Prepharmacy program requires 66–72 credit hours, depending on the pharmacy school of interest. Upon completion of the program, students will be eligible to apply to a college of pharmacy, usually the South Carolina College of Pharmacy (MUSC and USC campuses), and may be eligible to apply for the Bachelor of Science in Preprofessional Studies. The degree in Pharmacy is awarded by the institution attended. It is important for students to work closely with their advisor as there are variations in courses required by the pharmacy schools.

For financial aid purposes, students in the Prepharmacy program are considered to be enrolled in a degree-seeking program.

First Year**First Semester**

- 3 - BIOL 103 General Biology I
- 1 - BIOL 105 General Biology Lab. I
- 4 - CH 101 General Chemistry
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - PSYCH 201 Introduction to Psychology
- 3 - Arts and Humanities (Non-Lit.) Requirement¹

18

Second Semester

- 3 - BIOL 104 General Biology II
- 1 - BIOL 106 General Biology Lab. II
- 4 - CH 102 General Chemistry
- 3 - ECON 200 Economic Concepts
- 3 - ENGL 103 Accelerated Composition
- 3 - EX ST 301 Introductory Statistics
- 1 - Elective

18

Second Year**First Semester**

- 4 - BIOSC 222 Human Anatomy and Phys. I
- 3 - CH 223 Organic Chemistry
- 1 - CH 227 Organic Chemistry Lab.
- 3 - PHYS 207 General Physics I
- 1 - PHYS 209 General Physics I Lab.
- 3 - Arts and Humanities (Literature) Requirement²
- 3 - History or Philosophy Requirement³

18

Second Semester

- 4 - BIOSC 223 Human Anatomy and Phys. II
- 3 - CH 224 Organic Chemistry
- 1 - CH 228 Organic Chemistry Lab.
- 3 - COMM 150 Intro. to Human Comm. *or*
- 3 - COMM 250 Public Speaking
- 3 - PHYS 208 General Physics II
- 1 - PHYS 210 General Physics II Lab.
- 3 - Science and Tech. in Society Requirement⁴

18

Third Year⁵

72–90 Total Semester Hours

¹A A H 210 or MUSIC 210²Select any ENGL course from General Education Arts and Humanities (Literature) Requirement.³See advisor.⁴See General Education Requirements.⁵Students planning to receive the Bachelor of Science degree upon completion of the program are required to complete a minimum of 18 additional credit hours which must include MICRO 305. See advisor for requirements.**PREREHABILITATION SCIENCES**

The Prerehabilitation Sciences major includes concentrations in physical therapy, occupational therapy, communication sciences and disorders, as well as in physician assisting and allied health areas. This curriculum is designed to meet the requirements of the programs in the College of Health Professions at the Medical University of South Carolina and other professional schools. The program requires a minimum of 90 semester hours of undergraduate coursework. In addition, students must apply to a professional school for acceptance into its program.

Because preparation for some of the concentrations, such as the physical therapy, occupational therapy, and communication sciences and disorders programs at MUSC, requires a baccalaureate degree in any area, students are advised to select a major with similar requirements after consultation with the Prerehabilitation Sciences advisor. The following curriculum fulfills the general requirements for those fields requiring less than a baccalaureate degree. Electives should be chosen after consultation with the advisor. Professional schools may change their requirements at any time, so it is imperative that students in this major stay in close contact with their advisor.

For financial aid purposes, students in the Prerehabilitation Sciences program are considered to be enrolled in a degree-seeking program.

First Year

First Semester

- 3 - BIOL 103 General Biology I
- 1 - BIOL 105 General Biology Lab. I
- 4 - CH 101 General Chemistry
- 3 - PSYCH 201 Introduction to Psychology
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 3 - Science and Technology in Society Req.¹

17

Second Semester

- 3 - BIOL 104 General Biology II
- 1 - BIOL 106 General Biology Lab. II
- 4 - CH 102 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 3 - EX ST 301 Introductory Statistics
- 3 - SOC 201 Introduction to Sociology
- 1 - Elective

18

Second Year

First Semester

- 4 - BIOSC 222 Human Anatomy and Phys. I
- 3 - PHYS 207 General Physics I
- 1 - PHYS 209 General Physics I Lab.
- 3 - PSYCH 340 Lifespan Developmental Psych.
- 3 - Arts and Humanities (Literature) Requirement²
- 3 - Arts and Humanities Requirement¹

17

Second Semester

- 4 - BIOSC 223 Human Anatomy and Phys. II
- 3 - COMM 150 Intro. to Human Comm. or
3 - COMM 250 Public Speaking
- 3 - CP SC 120 Intro. to Information Technology
- 3 - PHYS 208 General Physics II
- 1 - PHYS 210 General Physics II Lab.
- 3 - Mathematics Requirement³

17

Third Year⁴

90 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

²Select any ENGL course from General Education Arts and Humanities (Literature) Requirement.

³See advisor.

⁴Students planning to receive the Bachelor of Science degree upon completion of the program are required to complete an additional 24 credit hours. See advisor for requirements.

PREVETERINARY MEDICINE

Under a regional plan, the South Carolina Preveterinary Advisory Committee coordinates a program for South Carolina residents who are interested in pursuing careers in veterinary medicine. South Carolina residents attending any college or university may apply through the Veterinary Medical College Application Service (VMCAS) to the University of Georgia College of Veterinary Medicine. Currently the University of Georgia admits up to 17 students each year through arrangements with the Southern Regional Education Board. The State of South Carolina has a contract with Mississippi State University to admit up to five South Carolina residents. The State of South Carolina also has a contract with

Tuskegee University to admit up to four South Carolina residents. Application must be made directly to Tuskegee University.

Minimum requirements for admission to a college of veterinary medicine generally include the satisfactory completion of prescribed courses in a well-rounded undergraduate degree program. Specific requirements for admission to the University of Georgia College of Veterinary Medicine include the following undergraduate courses: six credits of English, 14 credits of humanities and social studies, eight credits of physics, eight credits of general biology, eight credits of advanced biology, three credits of biochemistry, and 16 credits of organic and inorganic chemistry. (Chemistry and physics courses must be at the premedical level; they may not be survey courses.)

To be in the best competitive position, applicants should complete courses in animal agriculture, genetics, nutrition, biochemistry, and advanced biology. Considerations for selection are character, scholastic achievement, personality, experience with large and small animals, general knowledge, and motivation. In the past, competition has been keen, and only those applicants who have shown exceptional ability have been admitted. Specific considerations may include a minimal grade-point average and completion of standardized tests such as the Graduate Record Examination and the Veterinary College Admission Test.

Since out-of-state students attending Clemson are ineligible to apply to the University of Georgia or Tuskegee University under the South Carolina quota, they should contact the college(s) of veterinary medicine to which they plan to apply. They may apply at the University of Georgia for at-large admission.

Veterinary schools accept students with a broad range of academic backgrounds; therefore, it is recommended that the beginning university student select any undergraduate major and simultaneously complete the courses required for veterinary school entrance and those required for completion of a BS or BA degree. For students selecting Animal and Veterinary Sciences or Biological Sciences at Clemson University, the basic curricula have been designed to accommodate Georgia's entrance requirements. Further information is available from the Department of Animal and Veterinary Sciences at (864) 656-3427.

SOILS AND SUSTAINABLE CROP SYSTEMS

Bachelor of Science

The BS degree program in Soils and Sustainable Crop Systems is a multidisciplinary program that educates students with expertise in soils, crop sciences, and applied agricultural biotechnology. It offers students a rigorous, science-based degree with educational opportunities related to management of agricultural commodities and natural resources, as well as soil and water resources. Students can tailor the program to fit their professional and academic goals by selecting one of three concentrations with emphasis areas.

The Agricultural Biotechnology Concentration integrates conventional discipline with molecular advances in plants, pathogens, and biosystem interactions and responds to the educational void between the rapid adoption of biotechnology products into agricultural production and the intermediate end-users, farmers, and consumers. Graduates in this concentration will be competitive as scientists in emerging agricultural biotechnology industries, as educators, and as policy makers and officers in regulatory agencies.

Students with a concentration in Soil and Water Environmental Science can address compelling problems such as land application of agricultural and industrial wastes, reduction of contamination of ground and surface waters, establishment of functional septic drain fields, and production of food and fiber crops. Graduates will be able to establish careers in traditional agrarian fields such as soil scientists and conservationists, extension agents, and farm consultants, and in the broader environmental arenas of DHEC, consulting engineering firms, and environmental consulting. Graduates will be well prepared for graduate work in fields ranging from soil science to environmental engineering and law.

Students with a concentration in Sustainable Crop Production will graduate with comprehensive knowledge to increase farm profits by decreasing the costs of crop and production; build soil tilth and fertility through rotations, multiple cropping, and nutrient cycling; protect the environment by minimizing or more efficiently using synthetic agrichemicals; manage crop pests and weeds with integrated, ecologically sound strategies; develop strategies for profitable marketing of agricultural commodities, and create a strong, diversified agriculture that is stable through market and weather fluctuations. Graduates can assume positions as self-employed farmers, farm managers, state and federal natural resource managers, research technicians, agricultural industry employees, greenhouse managers, consultants in pest management and sustainable agriculture, field ecology professionals, agritourism industry specialists, extension personnel, or regulatory officers.

Freshman Year

First Semester

- 5 - BIOL 110 Principles of Biology I¹
- 4 - CH 101 General Chemistry
- 3 - MTHSC 102 Intro. to Math. Analysis² or
4 - MTHSC 106 Calculus of One Variable I
- 1 - SSCS 101 Survey of Soils and Sustainable Crop Systems
- 3 - Arts and Humanities (Non-Lit.) Requirement³

16-17

Second Semester

- 5 - BIOL 111 Principles of Biology II¹
- 4 - CH 102 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 3 - EX ST 301 Introductory Statistics² or
4 - MTHSC 108 Calculus of One Variable II or
4 - MTHSC 207 Multivariable Calculus
- 1 - SSCS 102 Academic and Professional Dev. I

16-17

¹BIOL 110 and 111 are strongly recommended; however, BIOL 103/105 may substitute for BIOL 110, and BIOL 104/106 may substitute for BIOL 111.

²MTWSC 106 is recommended for students in the Agricultural Biotechnology Concentration.

³See General Education Requirements. PHIL 103 is recommended for students in the Agricultural Biotechnology Concentration.

AGRICULTURAL BIOTECHNOLOGY CONCENTRATION

Sophomore Year

First Semester

- 3 - CH 223 Organic Chemistry
 - 1 - CH 227 Organic Chemistry Lab.
 - 3 - COMM 250 Public Speaking
 - 3 - ECON 200 Economic Concepts¹ or
3 - ECON 211 Principles of Microeconomics¹
 - 3 - SSCS 333 Agricultural Genetics
 - 3 - Arts and Humanities (Literature) Requirement²
- 16

Second Semester

- 3 - AP EC 205 Agriculture and Society
 - 3 - BIOSC 335 Evolutionary Biology
 - 3 - CH 224 Organic Chemistry
 - 1 - CH 228 Organic Chemistry Lab.
 - 3 - GEN 300 Fundamental Genetics
 - 1 - GEN 301 Fundamental Genetics Lab.
- 14

Junior Year

First Semester

- 3 - BIOCH 305 Essential Elements of Biochem.
 - 1 - BIOCH 306 Essential Elements of Bioch. Lab.
 - 3 - BIOSC 304 Biology of Plants
 - 3 - CSENV 422 Major World Crops
 - 3 - SSCS 333 Agricultural Biotechnology
 - 3 - Social Science Requirement²
- 16

Second Semester

- 1 - CSENV 350 Practicum
 - 3 - ENGL 315 Scientific Writing and Comm.
 - 3 - PL PA 310 Plant Diseases and People
 - 3 - PL PH (BIOSC) 340 Plant Med. and Magic
 - 1 - SSCS 401 Academic and Professional Dev. II
 - 4 - Emphasis Area Requirement³
- 15

Senior Year

First Semester

- 3 - BIOSC 401 Plant Physiology
 - 1 - BIOSC 402 Plant Physiology Lab.
 - 3 - CSENV 350 Practicum
 - 4 - ENT (BIOSC) 301 Insect Biology and Diversity
 - 1 - SSCS 445 Regulatory Issues and Policies
 - 1 - SSCS 450 Agric. Biosystems and Risk Assess.
 - 3 - Emphasis Area Requirement³
- 16

Second Semester

- 2 - CSENV 350 Practicum
 - 3 - CSENV 409 Biology of Invasive Plants
 - 1 - SSCS 451 Agric. Biotech. and Global Society
 - 9 - Emphasis Area Requirement³
- 15

124-126 Total Semester Hours

¹ECON 200 is recommended for students in the Agricultural Biosystems and Technology Emphasis Area. ECON 211 is recommended for students in the Agricultural Biotechnology and Global Society Emphasis Area.

²See General Education Requirements.

³Select from department-approved list. Emphasis Areas include Agricultural Biosystems and Technology; and Agricultural Biotechnology and Global Society.

SOIL AND WATER ENVIRONMENTAL SCIENCE CONCENTRATION

Sophomore Year

First Semester

- 3 - CH 223 Organic Chemistry and
1 - CH 227 Organic Chemistry Lab. or
4 - CH 201 Survey of Organic Chemistry
 - 4 - CSENV 202 Soils
 - 3 - GEOL 101 Physical Geology
 - 1 - GEOL 103 Physical Geology Lab.
 - 3 - PHYS 207 General Physics I and
1 - PHYS 209 General Physics I Lab. or
3 - PHYS 122 Physics with Calculus I and
1 - PHYS 124 Physics Lab. I
- 16

Second Semester

- 3 - PHYS 208 General Physics II and
1 - PHYS 210 General Physics II Lab. or
3 - PHYS 221 Physics with Calculus II and
1 - PHYS 223 Physics Lab. II
 - 3 - Arts and Humanities (Literature) Requirement¹
 - 3 - Cross-Cultural Awareness Requirement¹
 - 4 - Emphasis Area Requirement²
- 14

Junior Year

First Semester

- 3 - COMM 250 Public Speaking
 - 4 - MICRO 305 General Microbiology
 - 5 - Emphasis Area Requirement²
 - 3 - Plant Science Requirement³
- 15

Second Semester

- 3 - CSENV 475 Soil Physics and Chemistry
 - 3 - CSENV 490 Beneficial Soil Organisms in
Plant Growth
 - 3 - ENGL 315 Scientific Writing and Comm.
 - 1 - SSCS 401 Academic and Professional Dev. II
 - 3 - Emphasis Area Requirement²
 - 3 - Social Science Requirement¹
- 16

Senior Year

First Semester

- 3 - CSENV 350 Practicum
 - 2 - CSENV 403 Soil Genesis and Classification
 - 1 - CSENV 455 Seminar
 - 3 - Applied Spatial Technology Requirement⁴
 - 3 - Emphasis Area Requirement²
 - 3 - Field Scale Environmental Mgt. Requirement⁵
- 15

Second Semester

- 3 - AGRIC (EN SP) 315 Environment and Agric.
 - 3 - BIOSC 401 Plant Physiology
 - 1 - BIOSC 402 Plant Physiology Lab.
 - 3 - CSENV (B E) 408 Land Treatment of
Wastewater and Sludges
 - 3 - Emphasis Area Requirement²
 - 3 - Social Science Requirement¹
- 16

124-126 Total Semester Hours

¹See General Education Requirements.

²Select from department-approved list. Emphasis Areas include Soil and Water Quality, Soil Management, and Soil Science.

³BIOSC 441, CSENV 421, 422, 423, (AP EC) 426, or HORT 456

⁴AG M 410, FOR 433, or other course approved by advisor

⁵AG M 402, ENTOX 421, or other course approved by advisor

SUSTAINABLE CROP PRODUCTION CONCENTRATION

Sophomore Year

First Semester

- 3 - AP EC 202 Agricultural Economics
 - 3 - CH 223 Organic Chemistry¹
 - 1 - CH 227 Organic Chemistry Lab.¹
 - 4 - CSENV 202 Soils
 - 3 - PL PA 310 Plant Diseases and People
- 14

Second Semester

- 3 - AP EC 205 Agriculture and Society
 - 3 - CH 224 Organic Chemistry¹
 - 1 - CH 228 Organic Chemistry Lab.¹
 - 3 - COMM 250 Public Speaking
 - 3 - SSCS 333 Agricultural Genetics
 - 3 - Plant Science Requirement²
- 16

Junior Year

First Semester

- 4 - ENT (BIOSC) 301 Insect Biology and Diversity
 - 3 - I P M 401 Principles of Integrated Pest Mgt.
 - 3 - Emphasis Area Requirement¹
 - 3 - Plant Science Requirement²
 - 3 - Social Science Requirement⁴
- 16

Second Semester

- 3 - BIOSC 401 Plant Physiology
 - 1 - BIOSC 402 Plant Physiology Lab.
 - 3 - CSENV 405 Plant Breeding
 - 3 - CSENV 409 Invasive Plants
 - 3 - ENGL 315 Scientific Writing and Comm.
 - 2 - PL PA 411 Plant Disease Diagnosis I
 - 1 - SSCS 401 Academic and Professional Dev. II
- 16

Senior Year

First Semester

- 3 - CSENV 490 Beneficial Soil Organisms in
Plant Growth
 - 3 - ENT 401 Insect Pests of Ornamental Plants
and Shade Trees or
4 - ENT 407 Applied Agricultural Entomology
 - 6 - Emphasis Area Requirement³
- 12-13

Second Semester

- 3 - CSENV 350 Practicum
- 3 - CSENV 452 Soil Fertility and Management
- 1 - CSENV 453 Soil Fertility Lab.
- 1 - CSENV 455 Seminar
- 3 - Arts and Humanities (Literature) Requirement⁴
- 6 - Emphasis Area Requirement¹

17

123-126 Total Semester Hours

¹CH 223, 227 and 224/228 are strongly recommended; however, CH 201 and BIOCH 305/306 may be substituted.

²BOSC 304, CSENV 422, 423, HORT 310, 455, 456, or other course approved by advisor

³Select from department-approved list. Emphasis Areas include Crop Production; and Integrated Pest Management.

⁴See General Education Requirements.

TURFGRASS**Bachelor of Science**

Turfgrass is a major part of our built environment and daily life, including home lawns, sports fields, and golf courses. Grassed areas are aesthetically attractive and provide many environmental benefits, including the prevention of soil erosion, noise reduction, improved water quality, and reduced injuries from sports.

Graduates pursue careers in management of professional golf courses and sports fields and in lawn care; production and sale of seed, sod, supplies, and equipment; or as technicians for businesses or government agencies. The curriculum provides a strong foundation in science, advanced business, and environmental and leadership skills that are needed for success in today's competitive environment. Courses in horticulture also provide a background for turfgrass managers who may have responsibilities for landscaped areas.

Students work closely with faculty in creative inquiry groups to investigate and implement solutions to real problems. Student interns experience a wide range of turf facilities, businesses, and public institutions to develop skills and experience needed for successful careers. In addition, the University's golf course (Walker Golf Course) and athletic fields offer great employment and learning opportunities.

Freshman Year**First Semester**

- 3 - BIOL 103 General Biology I
- 1 - BIOL 105 General Biology Lab. I
- 4 - CH 101 General Chemistry¹ or
- 4 - CH 105 Chemistry in Context¹
- 3 - HORT 101 Horticulture
- 4 - Spanish Language Requirement²

15

Second Semester

- 4 - CH 102 General Chemistry¹ or
- 4 - CH 106 Chemistry in Context¹
- 3 - ENGL 103 Accelerated Composition
- 1 - HORT 102 Experience Horticulture
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 4 - Related Science Requirement²

15

Sophomore Year**First Semester**

- 3 - HORT 212 Introduction to Turfgrass Culture
- 1 - HORT 213 Turfgrass Culture Lab.
- 3 - HORT 303 Landscape Plants
- 3 - MTHSC 101 Essential Math for Informed Soc.
- 4 - Plant Biology Requirement²

14

Second Semester

- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - Business Requirement²
- 3 - Related Science Requirement²
- 3 - Social Science Requirement¹

1 - Elective

13

Summer

- 3 - HORT 271 Internship⁴ or
- 3 - HORT 471 Advanced Internship⁴

Junior Year**First Semester**

- 4 - CSENV 202 Soils
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 3 - Business Requirement²
- 3 - Related Science Requirement²
- 3 - Social Science Requirement¹

16

Second Semester

- 3 - BOSC 401 Plant Physiology
- 1 - BOSC 402 Plant Physiology Lab.
- 1 - HORT 409 Seminar
- 3 - HORT 420 Applied Turfgrass Physiology
- 2 - PL PA (ENT) 406 Diseases and Insects of Turfgrasses
- 3 - Horticulture Specialization Requirement²
- 3 - Oral Communication Requirement¹

16

Maymester

- 1 - PL PA (ENT) 408 Diseases and Insects of Turfgrasses Laboratory

Senior Year**First Semester**

- 3 - HORT 412 Advanced Turfgrass Management
- 3 - Business Requirement²
- 3 - Horticulture Specialization Requirement²
- 3 - Related Science Requirement²
- 3 - Soils Requirement²

15

Second Semester

- 3 - HORT (CSENV) 433 Landscape and Turf Weed Management
- 3 - Horticulture Specialization Requirement²
- 3 - Related Science Requirement²
- 3 - Soils Requirement²

12

120 Total Semester Hours

¹Students not taking the CH 105/106 sequence must satisfy the General Education Science and Technology in Society Requirement by selecting a qualifying course from the Related Science Requirement.

²See advisor. Select from department-approved list.

³See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

⁴Internship must be completed in one or two semesters. Internship may be done fall, spring, or summer after completing HORT 212/213. Prior approval is required for internships, and a 2.0 grade-point ratio is required for registration.

Note: Turfgrass majors must make a C or better in all HORT designated courses. Courses may be repeated as often as necessary to achieve the minimum grade.

WILDLIFE AND FISHERIES BIOLOGY**Bachelor of Science**

Increased interest in conservation of natural resources and the environment and demand for seafood products has resulted in these areas becoming increasingly technical and requiring highly qualified wildlife and fisheries biologists. Greatest demands for graduates are in the areas of management, research, survey, and regulatory positions with state and federal agencies; industrial research and quality control laboratories; conservation, recreation, and other public service agencies; and private enterprises.

The Bachelor of Science degree program in Wildlife and Fisheries Biology provides a solid foundation for many careers in the sciences. The curriculum is strong in basic and applied sciences, communication skills, and the social sciences. In addition, three credit hours are available for field training with appropriate natural resource agencies. Students may satisfy coursework requirements for professional certification by the Wildlife Society and/or the American Fisheries Society.

For students interested in conservation biology, water, and natural resources, the Department of Forestry and Natural Resources also administers the Conservation Biology and Natural Resources Management Concentrations within the Environmental and Natural Resources degree program. See page 49 for program details.

Combined Bachelor of Science/Master of Science Degree Program

Under this plan, students may reduce the time necessary to earn both degrees by applying graduate credits to both undergraduate and graduate program requirements. Students are encouraged to obtain the specific requirements for the dual degree from the Department of Forestry and Natural Resources as early as possible in their undergraduate program, as a number of required courses have prerequisites not normally taken by Wildlife and Fisheries Biology majors. Enrollment guidelines and procedures can be found under Academic Regulations in this catalog.

Freshman Year

First Semester

- 3 - BIOL 103 General Biology I
 - 1 - BIOL 105 General Biology Lab. I
 - 4 - CH 105 Chemistry in Context I¹
 - 1 - E N R 101 Intro. to Env. and Natural Res. I
 - 3 - MTHSC 102 Intro. to Mathematical Analysis
 - 3 - Oral Communication Requirement²
-
- 15

Second Semester

- 3 - BIOL 104 General Biology II
 - 1 - BIOL 106 General Biology Lab. II
 - 4 - CH 106 Chemistry in Context II¹ or
4 - PHYS 200 Introductory Physics¹
 - 3 - ENGL 103 Accelerated Composition
 - 3 - EX ST 301 Introductory Statistics
 - 1 - F N R 102 FNR Freshman Portfolio
-
- 15

Sophomore Year

First Semester

- 4 - F N R 204 Soil Information Systems
 - 2 - FOR 205 Dendrology
 - 3 - FOR 221 Forest Biology
 - 3 - W F B 300 Wildlife Biology
 - 1 - W F B 301 Wildlife Biology Lab.
 - 3 - Arts and Humanities (Non-Lit.) Requirement²
-
- 16

Second Semester

- 3 - FOR 206 Forestry Ecology
 - 3 - W F B (BIOSC) 313 Conservation Biology
 - 3 - W F B 350 Principles of Fish and Wildlife Biol.
 - 3 - Arts and Humanities (Literature) Requirement²
 - 3 - Social Science Requirement²
-
- 15

Junior Year

First Semester

- 3 - BIOSC 303 Vertebrate Biology
 - 4 - BIOSC 320 Field Botany
 - 3 - ENGL 314 Technical Writing
 - 3 - GEN 300 Fundamental Genetics
 - 3 - W F B 410 Wildlife Management Techniques
-
- 16

Second Semester

- 3 - W F B 412 Wildlife Management
 - 3 - W F B 416 Fishery Biology
 - 3 - W F B 440 Non-Game Wildlife Management
 - 3 - W F B 462 Wetland Wildlife Biology
 - 3 - Approved Requirement³
-
- 15

Senior Year

First Semester

- 3 - AP EC 257 Natural Resources, Environment, and Economics
 - 4 - AVS 301 Anat. and Phys. of Domestic Animals
 - 3 - FOR (E N R) 434 GIS for Landscape Planning
 - 1 - W F B 498 Senior Portfolio
 - 4 - Approved Requirement³
-
- 15

Second Semester

- 1 - F N R 499 Natural Resources Seminar
 - 3 - W F B 430 Wildlife Conservation Policy
 - 8 - Approved Requirement³
 - 3 - Policy and Law Requirement³
-
- 15

122 Total Semester Hours

¹Students planning to take organic chemistry should substitute CH 101 and 102.

²See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement; and, if CH 105 is not selected, three credits must also satisfy the Science and Technology in Society Requirement. (Note: Social Science Requirement must be in an area other than economics or applied economics.)

³Select from department-approved list.

MINORS

Following are minors acceptable for students in the College of Agriculture, Forestry and Life Sciences. Students cannot major and minor in the same field or acquire a minor that is not allowed by the degree program.

Accounting	Management
Adult/Extension Education	Management Information Systems
Aerospace Studies	Mathematical Sciences
Agricultural Business Management	Microbiology
Agricultural Mechanization and Business	Military Leadership
American Sign Language Studies	Modern Languages
Animal and Veterinary Sciences	Music
Anthropology	Natural Resource Economics
Architecture	Nonprofit Leadership
Athletic Leadership	Packaging Science
Biochemistry	Pan African Studies
Biological Sciences	Park and Protected Area Management
Business Administration	Philosophy
Chemistry	Physics
Cluster	Plant Pathology
Communication Studies	Political Science
Computer Science	Psychology
Crop and Soil Environmental Science	Public Policy
East Asian Studies	Religion
Economics	Russian Area Studies
Education	Science and Technology in Society
English	Screenwriting
Entomology	Sociology
Entrepreneurship	Spanish-American Area Studies
Environmental Engineering	Theatre
Environmental Science and Policy	Therapeutic Recreation
Equine Business—not open to Animal and Veterinary Sciences majors	Travel and Tourism
Film Studies	Turfgrass—not open to Horticulture majors
Financial Management	Urban Forestry
Food Science	Wildlife and Fisheries Biology
Forest Products	Women's Studies
Forest Resource Management	Writing
Genetics	
Geography	See pages 36–39 for details.
Geology	
Global Politics	
Great Works	
History	
Horticulture—not open to Turfgrass majors	
International Engineering and Science	
Legal Studies	

COLLEGE OF ARCHITECTURE, ARTS AND HUMANITIES

By uniting the humanities with the disciplines of design and building and the arts, the College of Architecture, Arts and Humanities offers one-of-a-kind opportunities for interdisciplinary exploration and achievement—opportunities that are at once rigorous and imaginative, classical and innovative. Students and faculty see their ideas expressed in a myriad of forms—as buildings and landscapes, as the written word, as music and drama, as paintings, pots, prints and photographs. They work in the very oldest media and the very newest. They work alone. They work together. They seek not only the imaginative answers, but the enduring questions.

The College of Architecture, Arts and Humanities is organized into three schools. The School of the Arts includes the departments of Art and Performing Arts. The School of Design and Building includes the School of Architecture, the Department of Construction Science and Management, and the Department of Planning and Landscape Architecture. The School of the Humanities includes the departments of Communication Studies; English; History; Languages; and Philosophy and Religion. In addition to the undergraduate and graduate degrees offered by the ten departments, an array of interdisciplinary programs is housed in the Office of the Dean, including the doctoral programs in Planning, Design and the Built Environment; and in Rhetorics, Communication and Information Design.

SCHOOL OF DESIGN AND BUILDING AND SCHOOL OF THE ARTS

The Bachelor of Arts in Architecture degree is the preprofessional preparation for graduate study leading to the Master of Architecture degree, which is the fully accredited professional degree in the field. The accredited Bachelor of Science in Construction Science and Management program prepares students for careers as professional managers in the construction industry. A graduate program is also offered leading to the Master of Construction Science and Management. The Visual Arts program offers professional study in the studio visual arts leading to the Bachelor of Fine Arts degree. A graduate program leading to the Master of Fine Arts is also offered. The accredited five-year Bachelor of Landscape Architecture degree program prepares students for careers as professional landscape architects. The Bachelor of Arts in Production Studies in Performing Arts is a distinctive degree program that combines practical hands-on experiences in performing arts production technologies with classes in music and theatre performance, history, and theory. A graduate program in City and Regional Planning is housed within the school and accepts graduates from a variety of baccalaureate programs and prepares them for careers in both public and private sector planning through

its Master of City and Regional Planning degree. The Master of Science in Historic Preservation degree is a professional degree program designed for students who will specialize in working with historic buildings, landscapes, and the decorative arts. The Master of Real Estate Development is a full-time, two-year professional degree jointly offered by the Department of Planning and Landscape Architecture and the Department of Finance in the College of Business and Behavioral Science.

In addition to the facilities housed on the Clemson campus, the College offers third- and fourth-year Architecture and fourth-year Landscape Architecture students the opportunity to earn credit toward their degrees at three off-campus sites. Students may spend a semester at the Charleston Architecture Center earning credit from both Clemson University and the College of Charleston. Additionally, the Charles E. Daniel Center for Building Research and Urban Studies in Genoa, Italy, and the Barcelona Program in Barcelona, Spain, provide students with an intensive program of study and travel in Europe.

Architecture Charleston Program

Located in Charleston, South Carolina, this program is available to qualified undergraduates in Architecture, Construction Science and Management, Landscape Architecture, and Visual Arts. Studio work is oriented toward design within the historic seaport setting. Students also enroll in classes at the College of Charleston campus. The program is enriched by visiting scholars and professionals from the area.

Architecture Overseas Program

The Daniel Center for Building Research and Urban Studies in Genoa, Italy, is available to qualified Bachelor of Arts in Architecture, Master of Architecture, Construction Science and Management, Fine Arts, City and Regional Planning, and professional year Landscape Architecture students. The Barcelona program in Barcelona, Spain, is available to qualified Bachelor of Arts in Architecture and professional year Landscape Architecture students. In both Genoa and Barcelona, studio and classroom work is enriched by visiting scholars and complemented by scheduled field trips in the country of program origin and in continental Europe.

Entrance Requirements

Admission to degree programs in the School of Design and Building and the School of the Arts is based on academic performance and is limited based on space availability in the various programs. Students seeking admission are advised to apply to the Admissions Office early in the fall of their senior year in high school. They are also encouraged to visit the school during their senior year. Faculty are available to meet with them and their parents informally and answer questions and discuss individual programs in more detail. Prospective students may schedule appointments by calling the individual department.

Advancement in Architecture

Students enrolled in second-, third-, or fourth-year design studios and theory courses must attain at least a 2.0 grade-point ratio in each year level (by repeating one or both semesters, if necessary) to qualify for advancement to the next year level or, in the case of fourth-year Architecture studios, to qualify for the Architecture degree, or in Landscape Architecture at the fifth year, to qualify for the Bachelor of Landscape Architecture degree.

SCHOOL OF HUMANITIES

The Bachelor of Arts degree is offered in Communication Studies, English, History, Language and International Trade, Modern Languages, and Philosophy. The Bachelor of Science degree is offered in Language and International Health.

To achieve depth as well as breadth in their education experiences, students majoring in Communication Studies, English, History, Modern Languages, or Philosophy complete at least 24 semester hours from courses above the sophomore level. As soon as feasible and not later than the end of the sophomore year, students in these fields also select a minor consisting of at least 15 additional semester hours. Courses satisfying the major may not also be included in the minor. A second major (a double major) may substitute for the minor, provided all requirements are fulfilled for each major.

The foreign language requirement is a proficiency requirement. Students must complete through 202 in Arabic, Chinese, French, German, Italian, Japanese, Latin, Portuguese, Russian, or Spanish.

Students enrolled in degree programs offered in the humanities who expect to teach in the public schools may elect education courses required for teaching certificates by the South Carolina Department of Education. Such courses are to be approved by their own department advisors.

Students may transfer into the Undeclared category in the humanities only if they have completed 45 or fewer credit hours. For more information, contact the College of Architecture, Arts and Humanities Advisement Center in 101 Strode Tower.

ARCHITECTURE

Bachelor of Arts

The Bachelor of Arts in Architecture prepares students for subsequent professional education by providing a sound general education, focused design studies, complementary support courses, and the opportunity to study abroad. The School of Architecture emphasizes the relationship of buildings to the rest of the environment: built, natural, and cultural. The curriculum includes seven semesters of studio in addition to complementary courses in architectural history and theory and building technology. Four of the studios are collaborative, taught by faculty in Architecture, Communication Studies, and English. The Bachelor of Arts also includes requirements for a minor and foreign language.

In the first two years of the program, students learn to apply the thinking and communications skills needed to pursue higher-level work in the discipline. The curriculum in the first two years also allows students to complete most of the University's general education requirements. In the last two years, students must select at least one of the location-specific studios and corequired coursework and may elect to take these studios for up to three semesters. The final studio focuses on reflection and synthesis.

Architectural Registration/Licensure

In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit U.S. professional degree programs in architecture, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. A program may be granted a six-year, three-year, or two-year term of accreditation, depending on the extent of its conformance with established educational standards. Master's degree programs may consist of a preprofessional undergraduate degree and a professional graduate degree that, when earned sequentially, constitute an accredited professional education. However, the preprofessional degree is not, by itself, recognized as an accredited degree. The Bachelor of Arts in Architecture provides a foundation in the field of architecture as preparation for either continued education in a professional degree program or for employment options in related fields.

Freshman Year

First Semester

- 3 - A A H 101 Survey of Art and Arch. History I
- 3 - ARCH 101 Introduction to Architecture
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - PHYS 207 General Physics I
- 1 - PHYS 209 General Physics I Lab.

17

Second Semester

- 3 - A A H 102 Survey of Art and Arch. History II
- 5 - ARCH 151 Architecture Communication
- 3 - BIOSC 203 Environment, Energy and Society
- 4 - Foreign Language Requirement¹

15

Sophomore Year

First Semester

- 6 - ARCH 251 Architecture Foundations I
- 3 - C S M 201 Structures I
- 3 - ENGL 212 World Literature
- 3 - Foreign Language Requirement¹

15

Second Semester

- 3 - A A H 204 History and Theory of Arch. II
- 6 - ARCH 252 Architecture Foundations II
- 3 - Foreign Language Requirement¹
- 3 - Social Science Requirement²

15

Junior Year

First Semester

- 3 - Architecture History/Theory Requirement¹
- 3 - Building Technology Requirement⁴
- 6 - Studio Requirement⁵
- 3 - Elective

15

Second Semester

- 3 - ARCH 401 Architectural Portfolio
- 6 - Minor Requirement⁶
- 6 - Studio Requirement⁵

15

Senior Year

First Semester

- 6 - Minor Requirement⁶
- 3 - Social Science Requirement²
- 6 - Studio Requirement⁵

15

Second Semester

- 6 - ARCH 452 Synthesis Studio
- 3 - Minor Requirement⁶
- 6 - Elective

15

122 Total Semester Hours

¹Three semesters (through 202) in the same foreign language are required.

²See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

³ARCH 403, 404, 405, or 412

⁴ARCH 414, 416, 421, C S M 202, 203, 205, 304, or 305

⁵ARCH 351, 352, 353 or 354

⁶See advisor.

COMMUNICATION STUDIES

Bachelor of Arts

The Bachelor of Arts in Communication Studies provides a thoroughly integrated yet individual degree program that prepares students for careers in business, government, and public sectors. In addition, the program provides a foundation for graduates who wish to pursue advanced degrees in the humanities, social sciences, business, and law. Through their coursework and extracurricular experiences, Communication Studies majors develop a set of skills in oral, written, and visual communication that enables them to research, design, present, and evaluate messages across diverse contexts and from a variety of platforms, including digital communication technology.

Students may change majors into the Communication Studies program based on approval of a committee of faculty from the Department of Communication Studies. The deadline for applying for a change of major during the fall semester is September 15, with decisions made by October 1. For spring semester changes of major, the deadline is February 15, with decisions made by March 1. The Department of Communication Studies accepts a maximum of 30 changes of major per year. To qualify for acceptance, applicants should have completed 15 credit hours including ENGL 103 and COMM 201 (with a C or better). All

students requesting a transfer into the Communication Studies program must have a grade-point ratio of 2.5 or higher. An application form and a writing sample are also required. Detailed information is available from the Communication Studies Department, 408 Strode Tower or the department Web site: www.clemson.edu/caah/communication.

Freshman Year

First Semester

- 1 - COMM 101 Communication Academic and Professional Development I
- 3 - ENGL 103 Accelerated Composition
- 4 - Foreign Language Requirement¹
- 3 - Mathematics Requirement²
- 3 - Social Science Requirement¹

14

Second Semester

- 4 - COMM 201 Intro. to Communication Studies
- 3 - COMM 250 Public Speaking
- 4 - Foreign Language Requirement¹
- 3 - Mathematics or Natural Science Requirement²
- 3 - Elective

17

Sophomore Year

First Semester

- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 3 - Emphasis Area Requirement⁴
- 3 - Foreign Language Requirement¹
- 4 - Natural Science Requirement¹
- 3 - Social Science Requirement¹

16

Second Semester

- 3 - COMM 301 Communication Theory or
- 3 - COMM 302 Mass Comm. Theory or
- 3 - COMM 315 Critical Discourse Theory
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - Foreign Language Requirement¹
- 6 - Elective

15

Junior Year

First Semester

- 3 - Communication Requirement³
- 3 - Emphasis Area Requirement⁴
- 3 - Minor Requirement
- 6 - Elective

15

Second Semester

- 3 - COMM 306 Discourse, Criticism and Society or
- 3 - COMM 310 Quantitative Research Methods in Communication Studies or
- 3 - COMM 311 Qualitative Research Methods in Communication Studies
- 3 - Communication Requirement³
- 6 - Minor Requirement
- 3 - Elective

15

Senior Year

First Semester

- 6 - Emphasis Area Requirement⁴
- 3 - Minor Requirement
- 6 - Elective

15

Second Semester

- 3 - COMM 495 Creative Inquiry Seminar
- 1 - COMM 498 Communication Academic and Professional Development II
- 3 - Minor Requirement
- 6 - Elective
- 13

120 Total Semester Hours

¹The foreign language requirement is a proficiency requirement. Students must complete through 202 in Arabic, Chinese, French, German, Italian, Japanese, Latin, Portuguese, Russian, or Spanish.

²EX ST 222 or 301 or MTHSC 203

³See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness Requirement and, if EX ST 222 is not selected, the Science and Technology in Society Requirement.

⁴See advisor. Emphasis area consists of 12 credit hours of COMM coursework at the 300-400 level with a single theme.

⁵Select from 300-400-level COMM courses.

CONSTRUCTION SCIENCE AND MANAGEMENT

Bachelor of Science

As the largest single industry in the United States and one of the most important, construction offers unlimited opportunities to highly motivated and professionally educated men and women. Future professionals must be skilled in managing people, equipment, and capital, in addition to having a thorough knowledge of construction materials and methods and the complex technologies of modern construction. The Bachelor of Science in Construction Science and Management curriculum is the basis for a career in construction or as a developer or building management specialist.

Change of major requests are considered only once a year, in late May or early June. Students who wish to change their major to Construction Science and Management must have completed at least 30 credit hours with a minimum grade-point ratio of 2.7; and must have successfully completed ENGL 103, PHYS 207/209, and the mathematics requirement (MTHSC 102 or 106) by the end of the spring semester of the year the change-of-major request is made. Students should contact the Construction Science and Management Department, 120 Lee Hall. The Department's Faculty Admissions Committee will consider all requests in late May or early June and select the top students by cumulative grade-point ratio based on space availability. Students who do not meet the minimum requirements at the end of spring semester will not be considered.

Freshman Year

First Semester

- 3 - A A H 210 Introduction to Art and Architecture
- 3 - C S M 100 Intro. to Construction Sci. and Mgt.
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 106 Calculus of One Variable I¹
- 3 - PHYS 207 General Physics I
- 1 - PHYS 209 General Physics I Lab.

17

Second Semester

- 3 - C S M 150 Construction Problem Solving
- 3 - COMM 150 Intro. to Human Comm. or
- 3 - COMM 250 Public Speaking
- 3 - CP SC 120 Intro. to Information Technology
- 3 - MTHSC 309 Introductory Business Statistics
- 3 - PHYS 208 General Physics II
- 1 - PHYS 210 General Physics II Lab.

16

Sophomore Year

First Semester

- 2 - AG M 221 Surveying
- 3 - C S M 201 Structures I
- 3 - C S M 203 Materials and Methods of Const. I
- 3 - ECON 211 Principles of Microeconomics
- 3 - Arts and Humanities (Literature) Requirement²

14

Second Semester

- 3 - ACCT 201 Financial Accounting Concepts
- 4 - C S M 202 Structures II
- 3 - C S M 204 Contract Documents
- 3 - C S M 205 Materials and Methods of Const. II
- 3 - ECON 212 Principles of Macroeconomics

16

Junior Year

First Semester

- 3 - C S M 303 Soils and Foundations
- 3 - C S M 304 Environmental Systems I
- 3 - C S M 351 Construction Estimating
- 3 - ENGL 304 Business Writing or
- 3 - ENGL 314 Technical Writing
- 3 - Social Science Requirement²

15

Second Semester

- 3 - C S M 305 Environmental Systems II
- 3 - C S M 352 Construction Scheduling
- 3 - C S M 353 Construction Estimating II
- 3 - LAW 322 Legal Environment of Business
- 3 - MGT 307 Human Resource Management

15

Senior Year

First Semester

- 3 - C S M 411 Safety in Building Construction
- 1 - C S M 450 Construction Internship
- 3 - C S M 453 Construction Project Management
- 3 - C S M 461 Construction Economics Seminar
- 6 - Major Requirement³

16

Second Semester

- 6 - C S M 454 Construction Capstone
- 6 - Major Requirement³
- 3 - Science and Tech. in Society Requirement²

15

124 Total Semester Hours

¹A sequence of MTHSC 102, 207 and 309 may be substituted.

²See General Education Requirements.

³Select from department-approved list or as approved in writing by advisor and department chair. Note: Six credit hours must be in business.

Note: A minimum of 800 hours of construction experience will be required prior to graduation.

ENGLISH

Bachelor of Arts

The core courses of the English major help students acquire an understanding of literature as a humanistic study; develop an appreciation and practical knowledge of the modes of literary expression, research, and criticism; and improve the ability to communicate effectively and intelligently.

By the end of the sophomore year, students choose between two emphasis areas: Literature or Writing and Publication Studies. The Literature Emphasis Area offers an extensive exploration of American and British literature, literary theory, and related disciplines such as creative writing and film. The Writing and Publication Studies Emphasis Area focuses on digital publishing, professional communication, rhetoric, creative writing, and writing about the arts. By teaching students to read closely, think critically, and communicate effectively, both emphasis areas prepare English majors for work in a variety of professional and academic fields.

The standard program of study consists of courses stipulated in the map below, which includes 24 credit hours of core courses and 15 hours chosen from one of the two emphasis areas.

Core Courses

ENGL 190, 310, and 390 and 18 additional credits selected from the following:

Literature Survey Requirement—Six credit hours from ENGL 396, 397, 398, 399

Shakespeare—ENGL 411

Language, Criticism, and Theory—Three credits from ENGL 400, 401, 435, (W S) 436, 440, 442, (COMM) 491, (COMM) 492

Advanced Writing—Three credits selected from ENGL 304, 312, 314, 315, 345, 346, (THEA) 347, 348

Major Electives—Three credits from 300- or 400-level ENGL courses

Capstone Seminar—ENGL 496

Literature Emphasis Area

Literature I (to 1699)—Three credits from ENGL 403, 407, 408, 410, 414, 420, 427, 429, 444, 463

Literature II (1700-1899)—Three credits from ENGL 415, 416, 417, 418, 421, 425, 426, 464

Literature III (from 1900)—Three credits from ENGL 428, (THEA) 430, 431, 432, 433, 434, 455, 465

Diversity—Three credits from ENGL 353, 380, 419, (HUM) 456, 482, 483

Major Electives—Three additional credits from 300- or 400-level ENGL courses

Writing and Publication Studies Emphasis Area

ENGL 499 plus 12 additional credits selected from the following:

Language, Criticism, and Theory—Three credits in addition to core requirements from ENGL 400, 401, 435, (W S) 436, 440, 442, (COMM) 491, (COMM) 492

Advanced Writing—Three credits, in addition to the Core Advanced Writing Requirement, selected from ENGL 304, 312, 314, 315, 345, 346, (THEA) 347, 348, 445, 446, (THEA) 447, 448, 490

WPS Courses—Six credits from ENGL 332, 387, 441, 460, 475, 478, 489, 495

Freshman Year

First Semester

- 3 - ENGL 103 Accelerated Composition
- 3 - HIST 172 The West and the World I
- 4 - Foreign Language Requirement¹
- 3 - Mathematics Requirement²
- 3 - Mathematics or Natural Science Requirement³

16

Second Semester

- 2 - ENGL 190 Introduction to the English Major
- 3 - ENGL 212 World Literature
- 3 - HIST 173 The West and the World II
- 4 - Foreign Language Requirement¹
- 4 - Natural Science Requirement²

16

Sophomore Year

First Semester

- 3 - ENGL 310 Critical Writing About Literature
- 3 - Arts and Humanities (Non-Lit.) Requirement³
- 3 - English Literature Survey Requirement⁴
- 3 - Foreign Language Requirement¹
- 3 - Elective

15

Second Semester

- 3 - COMM 150 Intro. to Human Comm. or
3 - COMM 250 Public Speaking
- 3 - English Literature Survey Requirement⁴
- 3 - Fine Arts Requirement⁵
- 3 - Foreign Language Requirement¹
- 3 - History/Philosophy Requirement⁶

15

Junior Year

First Semester

- 6 - Major Requirement⁷
- 3 - Minor Requirement
- 3 - Science and Tech. in Society Requirement²
- 3 - Social Science Requirement⁸

15

Second Semester

- 1 - ENGL 390 Electronic Portfolio Studio
- 6 - Major Requirement⁷
- 6 - Minor Requirement
- 3 - Elective

16

Senior Year

First Semester

- 9 - Major Requirement⁷
- 3 - Minor Requirement
- 3 - Elective

15

Second Semester

- 3 - ENGL 496 Senior Seminar
- 6 - Major Requirement⁷
- 3 - Minor Requirement

12

120 Total Semester Hours

¹The foreign language requirement is a proficiency requirement. Students must complete through 202 in American Sign Language, Arabic, Chinese, French, German, Italian, Japanese, Latin, Portuguese, Russian, or Spanish.

²See General Education Requirements.

³See General Education Requirements. Select from courses in philosophy.

⁴ENGL 396, 397, 398, or 399

⁵A A H 101, 210, ENGL 357, HUM 301, 302, 306, MUSIC 210, 311, 415, 416, or THEA 210

⁶Any 300- or 400-level HIST or PHIL course

⁷See major requirements in program description above.

⁸See General Education Requirements. Must be in an area other than history.

HISTORY

Bachelor of Arts

The History major provides students with flexibility to pursue their particular interests in history. The major includes 34 credit hours in history, in addition to HIST 172 and 173, as outlined below.

Pre-law students majoring in History should consult their advisor for a recommended program.

Freshman Year

First Semester

- 3 - ENGL 103 Accelerated Composition
- 3 - HIST 172 The West and the World I
- 4 - Foreign Language Requirement¹
- 4 - Natural Science Requirement²
- 2 - Elective

16

Second Semester

- 3 - HIST 173 The West and the World II
- 4 - Foreign Language Requirement¹
- 3 - Geography Requirement³
- 3 - Mathematics Requirement²
- 3 - Mathematics or Natural Science Requirement²

16

Sophomore Year

First Semester

- 3 - Arts and Humanities (Literature) Requirement²
- 3 - Arts and Humanities (Non-Lit.) Requirement²
- 3 - Foreign Language Requirement¹
- 3 - Major Requirement⁴
- 3 - Elective

15

Second Semester

- 4 - HIST 299 Seminar: The Historian's Craft
- 3 - Advanced Humanities Requirement⁵
- 3 - Foreign Language Requirement¹
- 3 - Major Requirement⁴
- 3 - Minor Requirement

16

Junior Year

First Semester

- 3 - Advanced Humanities Requirement⁵
- 6 - Major Requirement⁴
- 3 - Minor Requirement
- 3 - Elective

15

Second Semester

- 3 - Literature Requirement⁶
- 6 - Major Requirement⁴
- 3 - Minor Requirement
- 3 - Elective

15

Senior Year

First Semester

- 3 - Advanced Humanities Requirement
- 6 - Major Requirement⁴
- 3 - Minor Requirement
- 3 - Elective

15

Second Semester

- 3 - HIST 490 Senior Seminar
- 3 - Major Requirement⁴
- 3 - Minor Requirement
- 3 - Elective

12

120 Total Semester Hours

¹The foreign language requirement is a proficiency requirement. Students must complete through 202 in American Sign Language, Arabic, Chinese, French, German, Italian, Japanese, Latin, Portuguese, Russian, or Spanish.

²See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

³GEOG 101, 103, or 106

⁴See advisor. Students must take three hours each of U.S. history, European history, and non-Western history. No more than six hours of 100- and 200-level history courses (in addition to HIST 299) may be counted towards the Major Requirements.

⁵A A H 210, MUSIC 210, THEA 210, or any humanities course numbered 300 or higher. The humanities for this purpose include A A H, COMM (except 364, 368), ENGL (except 304, 312, 314, 316, 333, 334, 335, 485, 490, 495), HUM, MUSIC, PHIL, REL, THEA (except 377, 487, 497), W 'S, and foreign language courses.

⁶Select from General Education Arts and Humanities (Literature) courses

LANDSCAPE ARCHITECTURE

Bachelor of Landscape Architecture

The profession of landscape architecture is broad and interdisciplinary. Practicing landscape architects work on a wide range of project types including, but not limited to, urban design, community design, historic preservation, ecological restoration, parks and park systems, institutional landscapes, memorials, cemeteries, industrial site reclamations, golf courses, wilderness areas and trails, residential landscapes, and gardens.

The profession is both an art and a science. Successful landscape architects are creative professionals who hold an environmental imperative and a social conscience. They are also excellent facilitators, able to bring numerous disciplines and professions together to work on complex projects in the landscape. Landscape Architecture students gain an understanding of this diverse range of subjects by participating in Clemson University's Creative Inquiry Initiative. As a consequence of numerous creative inquiry experiences within the program, students will develop greater skills in teamwork, creative thinking, problem solving, and communication.

Clemson's Landscape Architecture program is noted for a special emphasis on the art of design. Consequently, the landscape architecture design studio experience is at the center of the student's education—42 hours of studio are required. The five-year program leads to an accredited Bachelor of Landscape Architecture degree. The program is generalist—covering the major areas of practice—and builds from design basics to sophisticated studio experiences such as regional design, urban design, and community design. The studio experience is supported by other courses inside and outside the Landscape Architecture curriculum that provide the necessary grounding in landscape history and social, cultural, environmental, and aesthetic theories. Students may also choose to focus elective credits on one of three areas: cultural issues, environmental issues, or professional development. Outstanding fifth-year students may apply for admission into a shortened Master of City and Regional Planning, Master of Landscape Architecture, or Master of Real Estate Development program.

Freshman Year

First Semester

- 3 - A A H 210 Intro. to Art and Architecture
- 3 - BIOL 103 General Biology I
- 1 - BIOL 105 General Biology Lab. I
- 3 - ENGL 103 Accelerated Composition
- 3 - LARCH 128 Technical Graphics
- 3 - LARCH 151 Basic Design I

16

Second Semester

- 3 - BIOL 104 General Biology II
- 1 - BIOL 106 General Biology Lab. II
- 3 - HORT 101 Horticulture
- 3 - LARCH 116 History of Landscape Arch.
- 3 - LARCH 152 Basic Design II
- 3 - MTHSC 102 Intro. to Mathematical Analysis

16

Sophomore Year

First Semester

- 2 - B E 222 Geomeasurements
- 3 - COMM 150 Intro. to Human Comm. *or*
3 - COMM 250 Public Speaking
- 3 - HORT 303 Landscape Plants
- 6 - LARCH 251 Landscape Arch. Design Fundamentals
- 3 - LARCH 428 Landscape Architecture Computer-Aided Design

17

Second Semester

- 4 - HORT 461 Problems in Landscape Design
- 6 - LARCH 252 Site Design in Landscape Arch.
- 3 - LARCH 262 Design Implementation I
- 3 - W F B (BIOSC) 313 Conservation Biology¹

16

Maymester

- 3 - LARCH 405 Urban Genesis and Form

Junior Year

First Semester

- 3 - GEOL 101 Physical Geology
- 1 - GEOL 103 Physical Geology Lab.
- 6 - LARCH 351 Regional Design and Ecology
- 3 - LARCH 362 Design Implementation II
- 3 - LARCH 503 Landscape Architecture Portfolio

16

Second Semester

- 3 - FOR (HORT) 427 Urban Tree Care
- 3 - GEOG 101 Introduction to Geography
- 6 - LARCH 352 Urban Design Studio
- 3 - LARCH 581 Land. Arch. Professional Practice
- 3 - Foreign Language Requirement²

18

Summer

- 2 - LARCH 293 Field Studies Internship *or*
2 - LARCH 493 Prof. Office Internship³

Senior Year

First Semester

- 1 - LARCH 418 Off-Campus Study Seminar
- 6 - LARCH 451 Community Design Studio
- 3 - Arts and Humanities (Literature) Requirement⁴
- 3 - Foreign Language Requirement²

13

Second Semester

- 3 - A A H 395 Special Topics in Visual Studies
Abroad I *or*
3 - A A H 396 Special Topics in Visual
American Studies I
- 3 - LARCH 419 Off-Campus Field Study
- 6 - LARCH 452 Off-Campus Studio

12

Professional Year

First Semester

- 3 - LARCH 453 Key Issues in Landscape Arch.
- 3 - Social Science Requirement⁵
- 9 - Elective

15

Second Semester

- 6 - LARCH 552 Landscape Arch. Exit Project
- 6 - Elective

12

156 Total Semester Hours

¹Other ecology courses from a department-approved list may be substituted.

²Two semesters (through 202) in the same foreign language are required.

³Two hours of internship credit are required. A maximum of six hours credit of internship may be scheduled.

⁴Select from department-approved list.

⁵See General Education Requirements.

LANGUAGE AND INTERNATIONAL HEALTH

Bachelor of Science

The Bachelor of Science program in Language and International Health is jointly administered by the Department of Languages and the Department of Public Health Sciences in the College of Health, Education and Human Development. Students acquire knowledge in public health theory and practice, including the history and philosophy of public health and medicine; the organization, management, and financing of health services; the social and behavioral aspects of health, epidemiology, health evaluation methods, and health communications. Students also acquire communicative competence in the target language and its culture, literatures, health environments, and multicultural issues.

The program requires the completion of a semester internship abroad. Graduates will be qualified to assume positions in a variety of settings, including integrated hospital systems, consulting firms, managed care organizations, pharmaceutical companies, as well as multicultural community centers. They can also pursue graduate degrees in community health, epidemiology/biostatistics, health administration, health systems and research.

In addition to the curriculum requirements below, students in the Language and International Health program will be required to pass a noncredit examination and submit a noncredit senior dossier to assess their language competence in various areas. Both assessments take place in the student's last full semester at the University.

Students who have completed fewer than 50 credit hours may change majors into Language and International Health with a minimum cumulative grade-point ratio of 2.5. Students with 50 or more credit hours may apply for a change of major into Language and International Health, based on space availability, with a minimum cumulative grade-point ratio of 2.75.

Freshman Year

First Semester

- 3 - BIOL 103 General Biology I
- 1 - BIOL 105 General Biology Lab. I
- 4 - CHIN 101 Elementary Chinese *or*
4 - SPAN 104 Basic Spanish
- 3 - ENGL 103 Accelerated Composition
- 3 - HLTH 202 Introduction to Public Health
- 1 - L&IH 127 Introduction to L&IH

15

Second Semester

- 4 - CHIN 102 Elementary Chinese *or*
3 - SPAN 201 Intermediate Spanish
- 3 - EX ST 301 Introductory Statistics
- 3 - HLTH 298 Human Health and Disease
- 3 - Emphasis Area Requirement¹
- 3 - Elective

15-16

Sophomore Year

First Semester

- 4 - CH 101 General Chemistry *or*
- 4 - CH 105 Chemistry in Context I
- 3 - CHIN 201 Intermediate Chinese *or*
- 3 - SPAN 202 Intermediate Spanish
- 3 - COMM 150 Intro. to Human Comm. *or*
- 3 - COMM 250 Public Speaking
- 3 - HLTH 470 International Health
- 3 - Social Science Requirement¹

16

Second Semester

- 4 - CH 102 General Chemistry *or*
- 4 - CH 106 Chemistry in Context II
- 3 - CHIN 202 Intermediate Chinese *or*
- 3 - SPAN 302 Inter. Span. Grammar and Comp. *or*
- 3 - SPAN 305 Inter. Span. Conv. and Comp. I
- 3 - HLTH 240 Determinants of Health Behavior
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 3 - Emphasis Area Requirement¹

16

Junior Year

First Semester

- 4 - BIOSC 222 Human Anatomy and Phys. I
- 3 - CHIN 305 Chinese Conversation and Comp. *or*
- 3 - SPAN 415 Spanish for Health Professionals
- 3 - CHIN 401 Premodern Chinese Literature *or*
- 3 - SPAN 311 Survey of Spanish-Amer. Lit. *or*
- 3 - SPAN 313 Survey of Spanish Literature I
- 3 - HLTH 380 Epidemiology²
- 3 - HLTH 480 Community Health Promotion

16

Second Semester

- 3 - CHIN 306 Chinese Conversation and Comp. *or*
- 3 - SPAN 307 The Hispanic World: Spain *or*
- 3 - SPAN 308 The Hispanic World: Latin America *or*
- 3 - SPAN 435 Contemporary Hispanic Culture
- 3 - CHIN (ANTH) 418 Chinese Culture and Society *or*
- 3 - SPAN 418 Tech. Spanish for Health Mgt. Prof.
- 3 - HLTH 490 Research and Evaluation Strategies for Public Health
- 3 - L&IT 400 Internship Abroad⁴
- 3 - Advanced Chinese Requirement⁵ *or*
- 3 - Advanced Spanish Requirement⁵ *or*
- 3 - Advanced Health Requirement⁶

15

Senior Year

First Semester

- 4 - BIOSC 223 Human Anatomy and Physiology II
- 3 - CHIN 317 Chinese for Health Professionals I *or*
- 3 - SPAN 419 Health and the Hispanic Commun.
- 3 - HLTH 440 Managing Health Service Org.
- 3 - Emphasis Area Requirement¹
- 3 - Elective

16

Second Semester

- 3 - CHIN 417 Chinese for Health Professionals II *or*
- 3 - Advanced Spanish Requirement⁵
- 3 - Advanced Health Requirement⁶
- 3 - Emphasis Area Requirement¹
- 3 - Social Science Requirement¹

12

121-122 Total Semester Hours

¹Select one of the following emphasis areas

Health Administration—select one course from four of the following groups:

- Accounting—ACCT 201
- Economics—ECON 211, 212
- Finance—FIN 306
- Health—C R D (AP EC, HLTH) 361, HLTH 475
- Law—LAW 322
- Management—MGT 201, 218, 390, 411, 416, 422, 423, (I E) 444, 452
- Marketing—MKT 301

Community Development—select one course from four of the following groups:

- Applied Economics—AP EC 202, 352
- Community Development—C R D (AP EC) 357, (AP EC) 411, (AP EC) 412
- Economics—ECON 211, 212,
- Health—C R D (AP EC, HLTH) 361
- Rural Sociology—R S (SOC) 401, (SOC) 459, SOC (R S) 371, (R S) 471
- Sociology—SOC 433

²ANTH 201, GEOG 103, HIST 172, 173, 193, PO SC 102, 104³See General Education Requirements. For students not taking the CH 105-106 sequence, three of these credit hours must also satisfy the Science and Technology in Society Requirement.⁴Internship must be taken in a country where the target language is spoken. The study abroad semester courses and internship must be taken concurrently as listed during the second semester of the junior year or later⁵Select from any 300-400-level courses in the target language except SPAN 310.⁶Select from any 300-400-level courses in HLTH.

LANGUAGE AND INTERNATIONAL TRADE

Bachelor of Arts

Students in the Bachelor of Arts program in Language and International Trade acquire communicative competence in the target language; a familiarity with specific peoples, cultures, literatures, and business environments; and the knowledge and skills to pursue graduate studies or careers in business within their language of specialization.

The Language and International Trade program combines foreign languages and international trade. Students choose one language concentration (Chinese, French, German, Japanese, or Spanish) and one professional concentration (Applied International Economics, International Trade, or Tourism).

The language component emphasizes speaking and writing skills, culture, civilization, and business/technical languages. The professional component introduces students to the core content of their preferred concentration, as well as to the international dimensions of that concentration.

Study abroad of at least one semester in the target language setting is mandatory. In addition, each student is required to complete an internship with an international company in the United States or a summer internship with a company abroad. Internships are subject to approval by the Language and International Trade Director. Students are strongly encouraged to participate in the Clemson Language Immersion Program (CLIP) prior to enrolling in study abroad programs.

In addition to the curriculum requirements below, students are required, as a condition of graduation, to pass a noncredit examination and submit a noncredit senior dossier to assess their language competence in various areas. Both assessments take place in the student's last full semester at the University.

Freshman Year

First Semester

- 4 - CHIN 101 Elementary Chinese *or*
- 4 - FR 101 Elementary French *or*
- 4 - GER 101 Elementary German *or*
- 4 - JAPN 101 Elementary Japanese *or*
- 4 - SPAN 104 Basic Spanish¹
- 3 - ENGL 103 Accelerated Composition
- 1 - L&IT 127 Introduction to L&IT
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 4 - Natural Science Requirement²

15

Second Semester

- 3 - ACCT 201 Financial Accounting Concepts *or*
- 3 - ACCT 202 Managerial Account. Concepts
- 4 - CHIN 102 Elementary Chinese *or*
- 4 - FR 102 Elementary French *or*
- 4 - GER 102 Elementary German *or*
- 4 - JAPN 102 Elementary Japanese *or*
- 3 - SPAN 201 Intermediate Spanish
- 3 - MTHSC 207 Multivariable Calculus
- 3 - Oral Communication Requirement³
- 2-3 - Elective

15

¹Students with no previous study of Spanish may take SPAN 101 and 102³See General Education Requirements.

APPLIED INTERNATIONAL ECONOMICS CONCENTRATION

Sophomore Year

First Semester

- 3 - AP EC 202 Agricultural Economics
- 3 - CHIN 201 Intermediate Chinese *or*
- 3 - FR 201 Intermediate French *or*
- 3 - GER 201 Intermediate German *or*
- 3 - JAPN 201 Intermediate Japanese *or*
- 3 - SPAN 202 Intermediate Spanish
- 3 - ECON 211 Principles of Microeconomics
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 3 - Social Science Requirement¹

15

Second Semester

- 3 - AP EC 309 Econ. of Agricultural Marketing
- 3 - CHIN 202 Intermediate Chinese *or*
- 3 - FR 202 Intermediate French *or*
- 3 - GER 202 Intermediate German *or*
- 3 - JAPN 202 Intermediate Japanese *or*
- 3 - SPAN 302 Intermediate Spanish Grammar and Composition *or*
- 3 - SPAN 306 Span. Composition for Bus.
- 3 - MKT 301 Principles of Marketing
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - Social Science Requirement¹

15

Junior Year**First Semester**

- 3 - AP EC 319 Agribusiness Management
- 3 - CHIN 305 Chinese Conv. and Comp. I *or*
- 3 - FR 305 Intermediate French Conversation and Composition I *or*
- 3 - GER 305 German Conv. and Comp. *or*
- 3 - GER 306 German Short Story *or*
- 3 - JAPN 305 Japanese Conv. and Comp. *or*
- 3 - SPAN 305 Intermediate Spanish Conversation and Composition I
- 3 - MKT 302 Consumer Behavior
- 3 - Advanced Social Science Requirement³
- 3 - Elective
- 15

Second Semester

- 3 - CHIN 316 Chinese for International Trade I *or*
- 3 - FR 316 French for International Trade I *or*
- 3 - GER 316 German for Int'l Trade I *or*
- 3 - JAPN 316 Japanese for Int'l Trade I *or*
- 3 - SPAN 316 Spanish for Int'l Trade I
- 3 - MGT 201 Principles of Management
- 3 - Advanced Agricultural Econ. Requirement⁴
- 3 - Advanced Foreign Language Requirement⁵
- 3 - Elective
- 15

Summer

- 3 - L&IT 400 L&IT Internship

Senior Year**First Semester**

- 3 - CHIN 416 Chinese for Int'l Trade II *or*
- 3 - FR 416 French for International Trade II *or*
- 3 - GER 416 German for Int'l Trade II *or*
- 3 - JAPN 416 Japanese for Int'l Trade II *or*
- 3 - SPAN 416 Spanish for Int'l Trade II
- 3 - ECON 310 International Economy *or*
- 3 - ECON 412 International Microeconomics
- 3 - MKT 427 International Marketing
- 3 - Advanced Agricultural Econ. Requirement⁴
- 3 - Foreign Language Civilization Requirement⁶
- 15

Second Semester

- 3 - MGT 423 International Management
- 6 - Advanced Foreign Language Requirement⁵
- 3 - Advanced Social Science Requirement³
- 12

120 Total Semester Hours

³See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

⁴Six credit hours selected from two different areas: ANTH 201, GEOG 103, HIST 172, 173, 193, PO SC 102, 104, PSYCH 201

⁵Select from 300-400-level courses in ANTH, AP EC, ECON, GEOG, HIST, PO SC, PSYCH, SOC

⁶AP EC 308, 351, 402, 409, 420, 433, 452, 456, or 460

⁷A minimum of nine credit hours of 300-400-level foreign language courses is required. At least one course must be in literature. Advanced grammar is recommended for those exempting 100-200 levels. FR H438 and H439 and SPAN H438 and H439 may not be used to satisfy requirements for the French or Spanish Concentration. Students may not take more than one foreign language course taught in English.

⁸CHIN (ANTH) 418, 499, FR 307, 317, GER 340, 405, 455, JAPN 307, 308, (ANTH) 417, 499, SPAN 307, 308, or 435

INTERNATIONAL TRADE CONCENTRATION**Sophomore Year****First Semester**

- 3 - CHIN 201 Intermediate Chinese *or*
- 3 - FR 201 Intermediate French *or*
- 3 - GER 201 Intermediate German *or*
- 3 - JAPN 201 Intermediate Japanese *or*
- 3 - SPAN 202 Intermediate Spanish
- 3 - ECON 211 Principles of Microeconomics
- 3 - MGT 201 Principles of Management
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 3 - Social Science Requirement²
- 15

Second Semester

- 3 - CHIN 202 Intermediate Chinese *or*
- 3 - FR 202 Intermediate French *or*
- 3 - GER 202 Intermediate German *or*
- 3 - JAPN 202 Intermediate Japanese *or*
- 3 - SPAN 302 Intermediate Spanish Grammar and Composition *or*
- 3 - SPAN 306 Span. Composition for Bus.
- 3 - ECON 212 Principles of Macroeconomics
- 3 - MKT 301 Principles of Marketing
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - Social Science Requirement²
- 15

Junior Year**First Semester**

- 3 - CHIN 305 Chinese Conv. and Comp. I *or*
- 3 - FR 305 Intermediate French Conversation and Composition I *or*
- 3 - GER 305 German Conv. and Comp. *or*
- 3 - GER 306 German Short Story *or*
- 3 - JAPN 305 Japanese Conv. and Comp. *or*
- 3 - SPAN 305 Intermediate Spanish Conversation and Composition I
- 3 - ECON 314 Intermediate Microeconomics
- 3 - MKT 302 Consumer Behavior
- 3 - Advanced Social Science Requirement³
- 3 - Elective
- 15

Second Semester

- 3 - CHIN 316 Chinese for International Trade I *or*
- 3 - FR 316 French for International Trade I *or*
- 3 - GER 316 German for Int'l Trade I *or*
- 3 - JAPN 316 Japanese for Int'l Trade I *or*
- 3 - SPAN 316 Spanish for Int'l Trade I
- 3 - ECON 315 Intermediate Macroeconomics
- 3 - Advanced Foreign Language Requirement⁴
- 3 - Advanced Marketing Requirement⁵
- 3 - Elective
- 15

Summer

- 3 - L&IT 400 L&IT Internship

Senior Year**First Semester**

- 3 - CHIN 416 Chinese for Int'l Trade II *or*
- 3 - FR 416 French for International Trade II *or*
- 3 - GER 416 German for Int'l Trade II *or*
- 3 - JAPN 416 Japanese for Int'l Trade II *or*
- 3 - SPAN 416 Spanish for Int'l Trade II
- 3 - MKT 427 International Marketing
- 3 - Advanced Economics Requirement⁶
- 3 - Foreign Language Civilization Requirement⁷
- 3 - Elective
- 15

Second Semester

- 3 - MGT 423 International Management
- 6 - Advanced Foreign Language Requirement⁴
- 3 - Advanced Social Science Requirement³
- 12

120 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

²Six credit hours selected from two different areas: ANTH 201, GEOG 103, HIST 172, 173, 193, PO SC 102, 104, PSYCH 201

³Select from 300-400-level courses in ANTH, AP EC, ECON, GEOG, HIST, PO SC, PSYCH, SOC

⁴A minimum of nine hours of 300-400-level foreign language courses is required. At least one course must be in literature. Advanced grammar is recommended for those exempting 100-200 levels. FR H438 and H439 and SPAN H438 and H439 may not be used to satisfy requirements for the French or Spanish Concentration. Students may not take more than one foreign language course taught in English.

⁵Any 300- or 400-level MKT course

⁶Any 300- or 400-level ECON course (ECON 310 recommended)

⁷CHIN (ANTH) 418, 499, FR 307, 317, GER 340, 405, 455, JAPN 307, 308, (ANTH) 417, 499, SPAN 307, 308, or 435

TOURISM CONCENTRATION**Sophomore Year****First Semester**

- 3 - CHIN 201 Intermediate Chinese *or*
- 3 - FR 201 Intermediate French *or*
- 3 - GER 201 Intermediate German *or*
- 3 - JAPN 201 Intermediate Japanese *or*
- 3 - SPAN 202 Intermediate Spanish
- 3 - ECON 211 Principles of Microeconomics
- 3 - PRMT 342 Introduction to Tourism
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 3 - Social Science Requirement²
- 15

Second Semester

- 3 - CHIN 202 Intermediate Chinese *or*
- 3 - FR 202 Intermediate French *or*
- 3 - GER 202 Intermediate German *or*
- 3 - JAPN 202 Intermediate Japanese *or*
- 3 - SPAN 302 Intermediate Spanish Grammar and Composition *or*
- 3 - SPAN 306 Span. Composition for Bus.
- 3 - MKT 301 Principles of Marketing
- 3 - PRMT 305 Safety and Risk Mgt. in PRMT *or*
- 3 - PRMT 343 Spatial Aspects of Tourist Behavior *or*
- 3 - PRMT 344 Tourism Markets and Supply
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - Social Science Requirement²
- 15

Junior Year**First Semester**

- 3 - CHIN 305 Chinese Conv. and Comp. I *or*
 3 - FR 305 Interim, French Conv. and Comp. I *or*
 3 - GER 305 German Conv. and Comp. *or*
 3 - GER 306 German Short Story *or*
 3 - JAPN 305 Japanese Conv. and Comp. *or*
 3 - SPAN 305 Intermediate Spanish
 Conversation and Composition I
- 3 - MKT 302 Consumer Behavior
 3 - Advanced PRTM Requirement¹
 3 - Advanced Social Science Requirement⁴
 3 - Elective
- 15

Second Semester

- 3 - CHIN 316 Chinese for International Trade I *or*
 3 - FR 316 French for International Trade I *or*
 3 - GER 316 German for Int'l Trade I *or*
 3 - JAPN 316 Japanese for Int'l Trade I *or*
 3 - SPAN 316 Spanish for Int'l Trade I
- 3 - MGT 201 Principles of Management
 3 - Advanced Foreign Language Requirement⁵
 3 - Advanced PRTM Requirement³
 3 - Elective
- 15

Summer

- 3 - L&IT 400 L&IT Internship

Senior Year**First Semester**

- 3 - CHIN 416 Chinese for Int'l Trade II *or*
 3 - FR 416 French for International Trade II *or*
 3 - GER 416 German for Int'l Trade II *or*
 3 - JAPN 416 Japanese for Int'l Trade II *or*
 3 - SPAN 416 Spanish for Int'l Trade II
- 3 - ECON 310 International Economy *or*
 3 - ECON 412 International Microeconomics
- 3 - MKT 427 International Marketing
 3 - Advanced PRTM Requirement³
 3 - Foreign Language Civilization Requirement⁶
- 15

Second Semester

- 3 - MGT 423 International Management
 6 - Advanced Foreign Language Requirement⁵
 3 - Advanced Social Science Requirement⁴
- 12

120 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

²Six credit hours selected from two different areas: ANTH 201, GEOG 103, HIST 172, 173, 193, PO SC 102, 104, PSYCH 201

³See advisor.

⁴Select from 300-400-level courses in ANTH, AP EC, ECON, GEOG, HIST, PO SC, PSYCH, SOC

⁵A minimum of nine hours of 300-400-level foreign language courses is required. At least one course must be in literature. Advanced grammar is recommended for those exempting 100-200 levels. FR H438 and H439 and SPAN H438 and H439 may not be used to satisfy requirements for the French or Spanish Concentration. Students may not take more than one foreign language course taught in English.

⁶CHIN (ANTH) 418, 499, FR 307, 317, GER 340, 405, 455, JAPN 307, 308, (ANTH) 417, 499, SPAN 307, 308, or 435

MODERN LANGUAGES**Bachelor of Arts**

The Bachelor of Arts degree in Modern Languages provides a broadly humanistic course of study in seven areas of concentration: American Sign Language, Chinese, French, German, Italian, Japanese, and Spanish. This course of study seeks to provide students with basic competence in both the relevant language and the literary and cultural heritage pertaining to that language. Moreover, students will be required to take at least two courses in cultural inquiry which are designed to sharpen their sense of cultural difference, to enhance their critical thinking skills, and to prepare them for citizenship in a global community of diverse cultural precepts and practices. In this respect, the Bachelor of Arts in Modern Languages is intended to prepare students for a wide range of careers in the international arena as well as for the kinds of graduate programs that are an appropriate starting point for such careers.

All Modern Languages students are required to study abroad with a Clemson-approved program for at least one semester in the case of Japanese and Spanish or for at least two semesters in the case of French and German.

As a condition of graduation, students in the Modern Languages program will be required to pass a noncredit examination and to submit an ePortfolio in the relevant language to assess their competence in that language. Both assessments take place in the student's last full semester of study.

AMERICAN SIGN LANGUAGE EMPHASIS AREA**Freshman Year****First Semester**

- 4 - A S L 101 American Sign Language
 3 - ENGL 103 Accelerated Composition
 3 - Mathematics Requirement¹
 3 - Oral Communication Requirement¹
 3 - Social Science Requirement¹
- 16

Second Semester

- 4 - A S L 102 American Sign Language
 3 - Mathematics or Natural Science Requirement¹
 4 - Natural Science Requirement¹
 3 - Social Science Requirement¹
 2 - Elective
- 16

Sophomore Year**First Semester**

- 3 - A S L 201 American Sign Language II
 3 - Arts and Humanities (Non-Lit.) Requirement¹
 3 - Fine Arts Requirement²
 3 - Minor Requirement
 4 - Elective
- 16

Second Semester

- 3 - A S L 202 American Sign Language II
 3 - Arts and Humanities (Literature) Requirement¹
 3 - History Requirement²
 3 - Minor Requirement
 3 - Elective
- 15

Junior Year**First Semester**

- 3 - LANG 303 Study Abroad Transfer
 3 - Advanced Language Requirement¹
 3 - Major Requirement¹
 3 - Minor Requirement
 3 - Elective
- 15

Second Semester

- 3 - Advanced Arts and Humanities Requirement¹
 3 - Major Requirement¹
 3 - Methodology and Theory Requirement¹
 3 - Minor Requirement
 3 - Elective
- 15

Senior Year**First Semester**

- 2 - LANG 499 Language Portfolio
 3 - Major Requirement¹
 3 - Methodology and Theory Requirement¹
 3 - Minor Requirement
 4 - Elective
- 15

Second Semester

- 3 - Advanced Arts and Humanities Requirement¹
 6 - Major Requirement¹
 3 - Methodology and Theory Requirement¹
- 12
- 120 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

²See advisor.

³Three credit hours from A S L 302 and a minimum of 12 credit hours of A S L 300-400-level courses is required.

CHINESE EMPHASIS AREA**Freshman Year****First Semester**

- 4 - CHIN 101 Elementary Chinese
 3 - ENGL 103 Accelerated Composition
 3 - Mathematics Requirement¹
 3 - Oral Communication Requirement¹
 3 - Social Science Requirement¹
- 16

Second Semester

- 4 - CHIN 102 Elementary Chinese
 3 - Mathematics or Natural Science Requirement¹
 4 - Natural Science Requirement¹
 3 - Social Science Requirement¹
 2 - Elective
- 16

Sophomore Year**First Semester**

- 3 - CHIN 201 Intermediate Chinese
 3 - Arts and Humanities (Non-Lit.) Requirement¹
 3 - Fine Arts Requirement²
 3 - Minor Requirement
 4 - Elective
- 16

Second Semester

- 3 - CHIN 202 Intermediate Chinese
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - History Requirement²
- 3 - Minor Requirement
- 3 - Elective

15

Junior Year**First Semester**

- 3 - LANG 303 Study Abroad Transfer²
- 3 - Advanced Language Requirement²
- 3 - Major Requirement³
- 3 - Minor Requirement
- 3 - Elective

15

Second Semester

- 3 - Advanced Arts and Humanities Requirement²
- 3 - Major Requirement³
- 3 - Methodology and Theory Requirement²
- 3 - Minor Requirement
- 3 - Elective

15

Senior Year**First Semester**

- 2 - LANG 499 Language Portfolio
- 3 - Major Requirement³
- 3 - Methodology and Theory Requirement²
- 3 - Minor Requirement
- 4 - Elective

15

Second Semester

- 3 - Advanced Arts and Humanities Requirement²
- 6 - Major Requirement³
- 3 - Methodology and Theory Requirement²

12

120 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

²See advisor.

³Select from CHIN 300-400-level courses. At least one course must be in literature. No more than two courses taught in English may be taken.

FRENCH EMPHASIS AREA**Freshman Year****First Semester**

- 3 - ENGL 103 Accelerated Composition
- 4 - FR 101 Elementary French¹
- 3 - Mathematics Requirement²
- 3 - Oral Communication Requirement²
- 3 - Social Science Requirement²

16

Second Semester

- 4 - FR 102 Elementary French¹
- 3 - Mathematics or Natural Science Requirement²
- 4 - Natural Science Requirement²
- 3 - Social Science Requirement²
- 2 - Elective

16

Sophomore Year**First Semester**

- 3 - FR 201 Intermediate French
- 3 - Arts and Humanities (Non-Lit.) Requirement²
- 3 - Fine Arts Requirement³
- 3 - Minor Requirement
- 4 - Elective

16

Second Semester

- 3 - FR 202 Intermediate French
- 3 - Arts and Humanities (Literature) Requirement²
- 3 - History Requirement³
- 3 - Minor Requirement
- 3 - Elective

15

Junior Year**First Semester**

- 3 - FR 305 Intermediate French Conversation and Composition
- 3 - LANG 303 Study Abroad Transfer³
- 3 - Major Requirement⁴
- 3 - Minor Requirement
- 3 - Elective

15

Second Semester

- 3 - Advanced Arts and Humanities Requirement³
- 3 - Major Requirement⁴
- 3 - Methodology and Theory Requirement³
- 3 - Minor Requirement
- 3 - Elective

15

Senior Year**First Semester**

- 2 - LANG 499 Language Portfolio
- 3 - Major Requirement⁴
- 3 - Methodology and Theory Requirement³
- 3 - Minor Requirement
- 4 - Elective

15

Second Semester

- 3 - Advanced Arts and Humanities Requirement³
- 6 - Major Requirement⁴
- 3 - Methodology and Theory Requirement³

12

120 Total Semester Hours

¹Students who have had previous instruction in French may take an accelerated one-semester course that covers the material presented in the standard first-year sequence. They must then take four additional elective credit hours.

²See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

³See advisor.

⁴Three credit hours from FR 300 or 304, three credit hours from FR 307 or 317, and a minimum of nine credit hours of FR 300-400-level courses is required, of which at least one course must be in literature at the 400 level. No more than one course taught in English may be taken.

GERMAN EMPHASIS AREA**Freshman Year****First Semester**

- 4 - GER 101 Elementary German¹
- 3 - ENGL 103 Accelerated Composition
- 3 - Mathematics Requirement²
- 3 - Oral Communication Requirement²
- 3 - Social Science Requirement²

16

Second Semester

- 4 - GER 102 Elementary German¹
- 3 - Mathematics or Natural Science Requirement²
- 4 - Natural Science Requirement²
- 3 - Social Science Requirement²
- 2 - Elective

16

Sophomore Year**First Semester**

- 3 - GER 201 Intermediate German
- 3 - Arts and Humanities (Non-Lit.) Requirement²
- 3 - Fine Arts Requirement³
- 3 - Minor Requirement
- 4 - Elective

16

Second Semester

- 3 - GER 202 Intermediate German
- 3 - Arts and Humanities (Literature) Requirement²
- 3 - History Requirement³
- 3 - Minor Requirement
- 3 - Elective

15

Junior Year**First Semester**

- 3 - GER 305 Ger. Conversation and Comp. or
- 3 - GER 306 German Short Story
- 3 - LANG 303 Study Abroad Transfer³
- 3 - Major Requirement⁴
- 3 - Minor Requirement
- 3 - Elective

15

Second Semester

- 3 - Advanced Arts and Humanities Requirement³
- 3 - Major Requirement⁴
- 3 - Methodology and Theory Requirement³
- 3 - Minor Requirement
- 3 - Elective

15

Senior Year**First Semester**

- 2 - LANG 499 Language Portfolio
- 3 - Major Requirement⁴
- 3 - Methodology and Theory Requirement³
- 3 - Minor Requirement
- 4 - Elective

15

Second Semester

- 3 - Advanced Arts and Humanities Requirement¹
- 6 - Major Requirement⁴
- 3 - Methodology and Theory Requirement¹

12

120 Total Semester Hours

¹Students who have had previous instruction in German may take an accelerated one-semester course that covers the material presented in the standard first-year sequence. They must then take four additional elective credit hours.

²See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

³See advisor.

⁴A minimum of 15 credit hours of GER 300-400-level courses is required, of which at least two courses must be in literature. No more than one course taught in English may be taken.

ITALIAN EMPHASIS AREA**Freshman Year****First Semester**

- 3 - ENGL 103 Accelerated Composition
- 4 - ITAL 101 Elementary Italian
- 3 - Mathematics Requirement¹
- 3 - Oral Communication Requirement¹
- 3 - Social Science Requirement¹

16

Second Semester

- 4 - ITAL 102 Elementary Italian
- 3 - Mathematics or Natural Science Requirement¹
- 4 - Natural Science Requirement¹
- 3 - Social Science Requirement¹
- 2 - Elective

16

Sophomore Year**First Semester**

- 3 - ITAL 201 Intermediate Italian
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 3 - Fine Arts Requirement²
- 3 - Minor Requirement
- 4 - Elective

16

Second Semester

- 3 - ITAL 202 Intermediate Italian
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - History Requirement²
- 3 - Minor Requirement
- 3 - Elective

15

Junior Year**First Semester**

- 3 - LANG 303 Study Abroad Transfer²
- 3 - Advanced Language Requirement²
- 3 - Major Requirement¹
- 3 - Minor Requirement
- 3 - Elective

15

Second Semester

- 3 - Advanced Arts and Humanities Requirement¹
- 3 - Major Requirement¹
- 3 - Methodology and Theory Requirement²
- 3 - Minor Requirement
- 3 - Elective

15

Senior Year**First Semester**

- 2 - LANG 499 Language Portfolio
- 3 - Major Requirement¹
- 3 - Methodology and Theory Requirement²
- 3 - Minor Requirement
- 4 - Elective

15

Second Semester

- 3 - Advanced Arts and Humanities Requirement¹
- 6 - Major Requirement¹
- 3 - Methodology and Theory Requirement²

12

120 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

²See advisor.

³Three credit hours from ITAL 301 or 302 and a minimum of 12 credit hours of ITAL 300-400-level courses is required, of which at least one course must be in literature. No more than one course taught in English may be taken.

JAPANESE EMPHASIS AREA**Freshman Year****First Semester**

- 3 - ENGL 103 Accelerated Composition
- 4 - JAPN 101 Elementary Japanese
- 3 - Mathematics Requirement¹
- 3 - Oral Communication Requirement¹
- 3 - Social Science Requirement¹

16

Second Semester

- 4 - JAPN 102 Elementary Japanese
- 3 - Mathematics or Natural Science Requirement¹
- 4 - Natural Science Requirement¹
- 3 - Social Science Requirement¹
- 2 - Elective

16

Sophomore Year**First Semester**

- 3 - JAPN 201 Intermediate Japanese
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 3 - Fine Arts Requirement²
- 3 - Minor Requirement
- 4 - Elective

16

Second Semester

- 3 - JAPN 202 Intermediate Japanese
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - History Requirement²
- 3 - Minor Requirement
- 3 - Elective

15

Junior Year**First Semester**

- 3 - JAPN 305 Japanese Conversation and Comp.
- 3 - LANG 303 Study Abroad Transfer²
- 3 - Major Requirement¹
- 3 - Minor Requirement
- 3 - Elective

15

Second Semester

- 3 - Advanced Arts and Humanities Requirement¹
- 3 - Major Requirement¹
- 3 - Methodology and Theory Requirement¹
- 3 - Minor Requirement
- 3 - Elective

15

Senior Year**First Semester**

- 2 - LANG 499 Language Portfolio
- 3 - Major Requirement¹
- 3 - Methodology and Theory Requirement¹
- 3 - Minor Requirement
- 4 - Elective

15

Second Semester

- 3 - Advanced Arts and Humanities Requirement¹
- 6 - Major Requirement¹
- 3 - Methodology and Theory Requirement¹

12

120 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

²See advisor.

³Select from 300-400-level courses in Japanese. At least one course must be in literature. No more than two courses taught in English may be taken.

SPANISH EMPHASIS AREA**Freshman Year****First Semester**

- 3 - ENGL 103 Accelerated Composition
- 4 - SPAN 101 Elementary Spanish¹
- 3 - Mathematics Requirement²
- 3 - Oral Communication Requirement¹
- 3 - Social Science Requirement¹

16

Second Semester

- 4 - SPAN 102 Elementary Spanish¹
- 3 - Mathematics or Natural Science Requirement¹
- 4 - Natural Science Requirement¹
- 3 - Social Science Requirement¹
- 2 - Elective

16

Sophomore Year**First Semester**

- 3 - SPAN 201 Intermediate Spanish
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 3 - Fine Arts Requirement²
- 3 - Minor Requirement
- 4 - Elective

16

Second Semester

- 3 - SPAN 202 Intermediate Spanish
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - History Requirement²
- 3 - Minor Requirement
- 3 - Elective

15

Junior Year

First Semester

- 3 - LANG 303 Study Abroad Transfer³
- 3 - SPAN 302 Intermediate Spanish Grammar and Composition or
- 3 - SPAN 305 Intermediate Spanish Conversation and Composition
- 3 - Major Requirement⁴
- 3 - Minor Requirement
- 3 - Elective
- 15

Second Semester

- 3 - Advanced Arts and Humanities Requirement³
- 3 - Major Requirement⁴
- 3 - Methodology and Theory Requirement³
- 3 - Minor Requirement
- 3 - Elective
- 15

Senior Year

First Semester

- 2 - LANG 499 Language Portfolio
- 3 - Major Requirement⁴
- 3 - Methodology and Theory Requirement³
- 3 - Minor Requirement
- 4 - Elective
- 15

Second Semester

- 3 - Advanced Arts and Humanities Requirement³
- 6 - Major Requirement⁴
- 3 - Methodology and Theory Requirement³
- 12

120 Total Semester Hours

¹Students who have had previous instruction in Spanish may take an accelerated one-semester course that covers the material presented in the standard first-year sequence. They must then take four additional elective credit hours.

²See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

³See advisor.

⁴Select from 400-level courses in Spanish.

PHILOSOPHY

Bachelor of Arts

The required course of study in Philosophy consists of the basic curriculum and either the standard Philosophy major, the Philosophy major with a Religious Studies Emphasis Area, or the Philosophy major with a Law, Liberty and Justice Emphasis Area. Philosophy majors must meet the requirements of the School of Humanities plus complete HIST 172 and 173 and 12 hours of 300–400-level coursework in one of the following areas: humanities (other than philosophy), math, science, or social science. Some courses may meet more than one requirement. All Philosophy majors must take PHIL 399 in the junior year. Preparation of the portfolio should begin as soon as the major is declared. Specific requirements include the following:

Standard Philosophy Major—PHIL 315, 316, 401 or 402, and 24 additional credits in PHIL selected with the advice and consent of the advisor. Three of these credits may be at the 100 level.

Law, Liberty and Justice Emphasis Area—PHIL 102, 315, 316, 304 or 320 or 321, 343, 401 or 402, HIST 328, 329, and nine additional credits in philosophy selected with the advice and consent of the pre-law advisor. Students with this emphasis area are strongly advised to include PO SC 437 and/or 438 as an elective, minor, or advanced area requirement.

Religious Studies Emphasis Area—REL 101 or 102, 301, 302, 401 or 402, PHIL 303, 315, 316, 401 or 402, and nine additional credits selected with the advice and consent of the advisor. Of these nine credits, three must be in philosophy and three must be in religion courses at the 300 level or above. (PO SC 407 may count as a religion course.) The remaining three credits may be in philosophy or religion but must be at the 300 level or above. Students with this emphasis area must choose a minor other than Religion.

Pre-law and Pre-medicine students majoring in Philosophy should consult the departmental advisor for help in tailoring the program to their needs.

Freshman Year

First Semester

- 3 - ENGL 103 Accelerated Composition
- 3 - HIST 172 The West and the World I
- 3 - Foreign Language Requirement¹
- 3 - Mathematics Requirement²
- 4 - Natural Science Requirement²
- 16

Second Semester

- 3 - HIST 173 The West and the World II
- 3 - Foreign Language Requirement¹
- 3 - Mathematics or Natural Science Requirement²
- 3 - Oral Communication Requirement²
- 3 - Social Science Requirement²
- 15

Sophomore Year

First Semester

- 3 - Cross-Cultural Awareness Requirement²
- 3 - Science and Tech. in Society Requirement²
- 3 - Major Requirement³
- 3 - Minor Requirement⁴
- 3 - Elective
- 15

Second Semester

- 3 - Arts and Humanities (Literature) Requirement²
- 6 - Major Requirement³
- 3 - Minor Requirement⁴
- 3 - Elective
- 15

Junior Year

First Semester

- 6 - Advanced Area Requirement⁵
- 6 - Major Requirement³
- 3 - Minor Requirement⁴
- 15

Second Semester

- 2 - PHIL 399 Philosophy Portfolio
- 9 - Major Requirement³
- 3 - Minor Requirement⁴
- 3 - Elective
- 17

Senior Year

First Semester

- 6 - Advanced Area Requirement⁵
- 3 - Major Requirement³
- 3 - Minor Requirement⁴
- 12

Second Semester

- 6 - Major Requirement³
- 9 - Elective
- 15

120 Total Semester Hours

¹The foreign language requirement is a proficiency requirement. Students must complete through 202 in Arabic, Chinese, French, German, Italian, Japanese, Latin, Portuguese, Russian, or Spanish.

²See General Education Requirements.

³See major requirements in program description above.

⁴See page 75 for approved minors. Students with a Religious Studies Emphasis Area may not minor in Religion.

⁵Select from 300–400-level courses in the humanities (must be from an area other than philosophy), mathematical sciences, science, or the social sciences.

PRODUCTION STUDIES IN PERFORMING ARTS

Bachelor of Arts

The Production Studies in Performing Arts degree is a nationally distinctive Bachelor of Arts degree that prepares students for careers in many aspects of the arts, including but not limited to performance, design, arts administration, and arts technologies. The curriculum offers specialized study in music, theatre, and audio technology. In addition to discipline-specific concentrations, all performing arts students take classes in performance, production, history, theory, and arts technology. The Brooks Center for the Performing Arts is a living performing arts laboratory where visiting artists and industry professionals provide additional experiential educational opportunities for Clemson students. Students may choose from more than 70 minors and select elective courses to tailor their degrees to their individual interests.

The degree is rooted in the liberal arts tradition with specific training in the performing arts. It provides the background for a number of career options or advanced studies such as graduate school, professional internships, and specialized postgraduate training.

The curriculum features a senior capstone project in which students spend their final year working as a production team, writing, composing, designing, marketing, and performing a final project.

To be considered for admission to this program, students must undergo an interview and/or audition with the Department of Performing Arts. Please note that students will not be eligible for admission to Clemson University in Production Studies in Performing Arts until this interview/audition is completed. Contact the department for specific requirements.

As a requirement for graduation, all Music Concentration students will be required to demonstrate piano competence equivalent to the 102 level, and all Audio Technology students will be required to demonstrate piano competence equivalent to the 101 level.

MUSIC CONCENTRATION**Freshman Year****First Semester**

- 3 - ENGL 103 Accelerated Composition
- 1 - MUSIC 153 Applied Music for Majors
- 3 - P A 101 Introduction to Performing Arts
- 1 - P A 103 Portfolio I
- 1 - P A 279 Performing Arts Practicum I
- 3 - Foreign Language Requirement¹
- 1 - Large Ensemble Requirement²
- 3 - Social Science Requirement³

16

Second Semester

- 1 - MUSIC 154 Applied Music for Majors
- 1 - P A 280 Performing Arts Practicum II
- 3 - THEA 210 Theatre Appreciation
- 3 - Foreign Language Requirement¹
- 1 - Large Ensemble Requirement²
- 3 - Mathematics Requirement³
- 4 - Natural Science Requirement³

16

Sophomore Year**First Semester**

- 3 - MUSIC 205 Music Theory I
- 1 - MUSIC 207 Aural Skills I
- 1 - MUSIC 253 Applied Music for Majors
- 3 - P A 201 Performing Arts Seminar I
- 1 - Large Ensemble Requirement²
- 3 - Mathematics or Natural Science Requirement³
- 3 - Social Science Requirement³
- 1 - Elective

16

Second Semester

- 3 - MUSIC 206 Music Theory II
- 1 - MUSIC 208 Aural Skills II
- 1 - MUSIC 254 Applied Music for Majors
- 3 - MUSIC 310 Survey of Music History
- 3 - Arts and Humanities (Literature) Requirement³
- 1 - Large Ensemble Requirement²
- 3 - Elective

15

Junior Year**First Semester**

- 3 - COMM 250 Public Speaking
- 1 - MUSIC 353 Applied Music for Majors
- 3 - P A 301 Principles of Arts Administration
- 3 - Minor Requirement
- 3 - Music History Requirement⁴
- 2 - Elective

15

Second Semester

- 3 - MUSIC 180 Introduction to Music Technology
- 1 - MUSIC 354 Applied Music for Majors
- 3 - MUSIC 430 Conducting
- 3 - Minor Requirement
- 3 - Music History Requirement⁴
- 2 - Elective

15

Senior Year**First Semester**

- 4 - P A 401 Senior Capstone Project
- 1 - P A 403 Portfolio II
- 3 - Minor Requirement
- 3 - Music History Requirement⁴
- 4 - Elective

15

Second Semester

- 6 - Minor Requirement
- 7 - Elective

13

121 Total Semester Hours

¹Students are expected to have completed the first year of language in high school or in a Clemson summer session before the first semester of the freshman year, except for Chinese or Japanese.

²Select from MUSIC 361, 362, 363, 364, 369, 370, 371, 372 only. No more than two credits of MUSIC 361 and/or 364 will count toward ensemble requirement. Keyboard students must take a minimum of one hour each of MUSIC 323, applied organ, and applied carillon for three of the four required ensemble credits.

³See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

⁴MUSIC 308, 309, 311, 312, 313, 314, 317, 318, 415, or 416

Note: As a requirement for graduation, Music Concentration students will be required to demonstrate piano competence at the 102 level.

**AUDIO TECHNOLOGY
EMPHASIS AREA****Freshman Year****First Semester**

- 3 - ENGL 103 Accelerated Composition
- 3 - MUSIC 285 Acoustics of Music
- 3 - P A 101 Introduction to Performing Arts
- 1 - P A 103 Portfolio I
- 3 - Foreign Language Requirement¹
- 3 - Elective

16

Second Semester

- 3 - MUSIC 180 Intro. to Music Technology
- 1 - P A 279 Performing Arts Practicum I
- 3 - THEA 210 Theatre Appreciation
- 3 - Foreign Language Requirement¹
- 3 - Mathematics Requirement²

1 - Elective

14

Sophomore Year**First Semester**

- 3 - MUSIC 205 Music Theory I
- 1 - MUSIC 207 Aural Skills I
- 3 - MUSIC 280 Sound Reinforcement
- 3 - MUSIC 380 Audio Engineering I
- 3 - P A 201 Performing Arts Seminar I
- 3 - Arts and Humanities (Literature) Requirement²

16

Second Semester

- 1 - P A 280 Performing Arts Practicum II
- 3 - Mathematics or Natural Science Requirement²
- 4 - Natural Science Requirement²
- 3 - Social Science Requirement²
- 4 - Elective

15

Junior Year**First Semester**

- 3 - MUSIC 480 Audio Engineering II
- 3 - P A 301 Principles of Arts Administration
- 3 - Minor Requirement
- 3 - Music History Requirement¹
- 3 - Social Science Requirement²

15

Second Semester

- 3 - COMM 250 Public Speaking
- 3 - MUSIC 310 Survey of Music History
- 3 - MUSIC 318 History of Audio Technology
- 3 - Minor Requirement
- 3 - Elective

15

Senior Year**First Semester**

- 1 - MUSIC 279 Music Practicum
- 4 - P A 401 Senior Capstone Project
- 1 - P A 403 Portfolio II
- 3 - Minor Requirement
- 3 - Music History Requirement¹
- 3 - Elective

15

Second Semester

- 3 - MUSIC 485 Production Workshop
- 6 - Minor Requirement
- 3 - Music Requirement⁴
- 3 - Elective

15

121 Total Semester Hours

¹Students are expected to have completed the first semester of elementary language in high school or in a Clemson summer session before the first semester of the freshman year, except for Chinese or Japanese.

²See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

³MUSIC 311, 312, 313, 314, 317, 415, or 416

⁴Select any 300- or 400-level music course.

Note: As a requirement for graduation, Audio Technology students will be required to demonstrate piano competence at the 101 level.

THEATRE CONCENTRATION**Freshman Year****First Semester**

- 3 - ENGL 103 Accelerated Composition
- 3 - P A 101 Introduction to Performing Arts
- 1 - P A 103 Portfolio I
- 1 - P A 279 Performing Arts Practicum I
- 3 - THEA 278 Acting I
- 3 - Foreign Language Requirement

14

Second Semester

- 3 - MUSIC 210 Music Appreciation
- 1 - P A 280 Performing Arts Practicum II
- 3 - THEA 277 Production Studies in Theatre
- 3 - Foreign Language Requirement¹
- 3 - Mathematics Requirement²
- 3 - Elective

16

Sophomore Year**First Semester**

- 3 - P A 201 Performing Arts Seminar I
 - 3 - THEA (ENGL) 347 The Structure of Drama
 - 3 - Arts and Humanities (Literature) Requirement²
 - 3 - Mathematics or Natural Science Requirement²
 - 3 - Elective
-
- 15

Second Semester

- 1 - THEA 279 Theatre Practicum
 - 3 - Advanced Theatre Requirement³
 - 4 - Natural Science Requirement²
 - 3 - Social Science Requirement²
 - 4 - Elective
-
- 15

Junior Year**First Semester**

- 3 - ENGL 429 Dramatic Literature I
 - 3 - P A 301 Principles of Arts Administration
 - 3 - THEA 376 Stage Directing I
 - 3 - Minor Requirement
 - 3 - Social Science Requirement²
-
- 15

Second Semester

- 3 - ENGL (THEA) 430 Dramatic Literature II
 - 3 - Advanced Theatre Requirement³
 - 3 - Minor Requirement
 - 6 - Elective
-
- 15

Senior Year**First Semester**

- 3 - COMM 250 Public Speaking
 - 4 - P A 401 Senior Capstone Project
 - 1 - P A 403 Portfolio II
 - 1 - THEA 279 Theatre Practicum
 - 3 - THEA 315 Theatre History I
 - 3 - Minor Requirement
 - 1 - Elective
-
- 16

Second Semester

- 1 - THEA 279 Theatre Practicum
 - 3 - THEA 316 Theatre History II
 - 3 - Advanced Theatre Requirement³
 - 6 - Minor Requirement
 - 2 - Elective
-
- 15

121 Total Semester Hours

¹The foreign language requirement is a proficiency requirement. Students must complete through 202 in American Sign Language, Arabic, Chinese, French, German, Italian, Japanese, Latin, Portuguese, Russian, or Spanish.

²See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirements.

³Select from 300- or 400-level courses in THEA. At least three hours must be at the 400 level.

VISUAL ARTS**Bachelor of Fine Arts**

The Bachelor of Fine Arts degree is the recognized professional undergraduate degree in the visual arts. The program offers students a balanced curriculum of academic coursework and studio art and art history courses in preparation for careers in studio-related areas of the visual arts. The department offers coursework in six studio disciplines: drawing, painting, sculpture, printmaking, photography, and ceramics.

Applicants for the BFA program in Visual Arts are encouraged to submit a portfolio of their creative work for scholarship opportunities. Guidelines are available from the Department or at www.clemson.edu/caah/art/degree_programs/undergraduate/degree_undergradportfolio.html.

In the freshman year, students participate in a foundations program comprised of four studio classes. These classes expose first-year art students to 2-D, 3-D, and 4-D studio practices; utilize traditional and new media; and place special emphasis on drawing. At the end of the freshmen year, students exhibit their work in a mandatory Foundations Review.

In the sophomore year, students take beginning-level courses in the six studio disciplines. In the junior year, students begin to concentrate their studio coursework in a specific discipline of the visual arts in preparation for the Senior Studio experience. The Senior Studio is a time in which concepts and skills are focused and developed to produce a cohesive body of artwork and a portfolio for graduate study and professional application.

Freshman Year**First Semester**

- 3 - A A H 101 Survey of Art and Arch. History I
 - 3 - ART 105 Foundation Drawing I
 - 3 - ART 151 Foundations in Visual Art I
 - 1 - ART 153 Orientation to Visual Arts I
 - 3 - ENGL 103 Accelerated Composition
 - 3 - Mathematics Requirement¹
-
- 16

Second Semester

- 3 - A A H 102 Survey of Art and Arch. History II
 - 3 - ART 106 Foundation Drawing II
 - 3 - ART 152 Foundations in Visual Art II
 - 3 - Social Science Requirement¹
 - 4 - Natural Science Requirement¹
-
- 16

Sophomore Year**First Semester**

- 3 - A A H 205 History and Theory of Art I
 - 3 - ART 221 Beginning New Media
 - 6 - Art 200 Requirement²
 - 3 - Mathematics or Natural Science Requirement¹
-
- 15

Second Semester

- 3 - A A H 206 History and Theory of Art II
 - 9 - Art 200 Requirement²
 - 3 - Arts and Humanities (Literature) Requirement¹
-
- 15

Junior Year**First Semester**

- 3 - A A H 305 Contemporary Art History
 - 3 - Art 200 Requirement²
 - 6 - Art 300/400 Requirement³
 - 3 - Elective
-
- 15

Second Semester

- 6 - Art 300/400 Requirement³
 - 3 - Oral Communication Requirement¹
 - 3 - Social Science Requirement¹
 - 3 - Elective
-
- 15

Senior Year**First Semester**

- 3 - ART 471 BFA Senior Studio I
 - 2 - ART 473 Senior Seminar in Professional Career Preparation
 - 3 - Art 300/400 Requirement³
 - 3 - Studio Requirement⁴
 - 3 - Elective
-
- 14

Second Semester

- 5 - ART 472 BFA Senior Studio II
 - 3 - Art 300/400 Requirement³
 - 3 - Studio Requirement⁴
 - 3 - Elective
-
- 14

120 Total Semester Hours

¹See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

²Any 200-level ART course except 215, 219, and 223

³Any 300-400-level ART course

⁴Any ART course or other course approved by advisor

MINORS

Following are minors acceptable for students in the College of Architecture, Arts and Humanities. Students cannot major and minor in the same field or acquire a minor that is not allowed by the degree program.

Accounting
 Adult/Extension Education
 Aerospace Studies
 Agricultural Business Management
 Agricultural Mechanization and Business
 American Sign Language Studies
 Animal and Veterinary Sciences
 Anthropology
 Architecture
 Athletic Leadership
 Biochemistry
 Biological Sciences
 Business Administration
 Chemistry
 Cluster
 Communication Studies
 Computer Science
 Crop and Soil Environmental Science
 East Asian Studies
 Economics
 Education
 English
 Entomology
 Entrepreneurship
 Environmental Engineering
 Environmental Science and Policy
 Equine Business
 Film Studies
 Financial Management
 Food Science
 Forest Products
 Forest Resource Management
 Genetics
 Geography
 Geology
 Global Politics
 Great Works
 History
 Horticulture
 International Engineering and Science
 Legal Studies
 Management
 Management Information Systems

Mathematical Sciences
 Microbiology
 Military Leadership
 Modern Languages—*not open to Language and International Trade majors*
 Music
 Natural Resource Economics
 Nonprofit Leadership
 Packaging Science
 Pan African Studies
 Park and Protected Area Management
 Philosophy
 Physics
 Plant Pathology
 Political Science
 Psychology
 Public Policy
 Religion—*not open to Philosophy—Religious Studies majors*
 Russian Area Studies
 Science and Technology in Society
 Screenwriting
 Sociology
 Spanish-American Area Studies
 Theatre
 Therapeutic Recreation
 Travel and Tourism
 Turfgrass
 Urban Forestry
 Wildlife and Fisheries Biology
 Women's Studies
 Writing

See pages 36–39 for details.

COLLEGE OF BUSINESS AND BEHAVIORAL SCIENCE

Students in the College of Business and Behavioral Science seek to understand and organize human behavior in a business, economic, and social context. The College promotes scholarship with broad awareness of the individual, cultural, political, and global levels and develops distinctive leaders in industry, higher education, professional and public service. The College includes the School of Accountancy and Finance, and the Departments of Aerospace Studies, Economics, Finance, Graphic Communications, Management, Marketing, Military Leadership, Political Science, Psychology, and Sociology.

All College of Business and Behavioral Science majors, and other non-majors taking 300- and 400-level courses offered by the College, are required to pay a differential fee to fund significant infrastructure and program enhancements. Additional information about this fee and the benefits derived from it is available at business.clemson.edu/special/enhanced/enhanced_fees.htm

BUSINESS AND PROFESSIONAL PROGRAMS

Bachelor of Science degrees are offered in Accounting, Economics, Financial Management, Graphic Communications, Management, and Marketing. With the exception of Graphic Communications, these programs share a common curriculum during the first year, allowing the student maximum flexibility in choosing an appropriate major. Accreditation by AACSB International (Association to Advance Collegiate Schools of Business) has been earned by the Business Programs, which include Accounting, Financial Management, Management, and Marketing. All business and professional curricula prepare students for a variety of careers and furnish an education that recognizes the need for an understanding of the basic principles of science, appreciation for the nature of human interaction, and the comprehension of the economic, political, and social environment.

Pre-Business Program

The Pre-Business program provides students planning to earn Bachelor of Science degrees in Accounting, Economics, Financial Management, Management, and Marketing with a sound academic preparation for these degrees. All Pre-Business students complete a common curriculum during the freshman year. All new Business students (including transfer students) are admitted into the Pre-Business program until the following core classes are satisfactorily completed and the grade-point ratio requirement is met: BUS 101, ECON 211, 212, MTHSC 102, 207 or acceptable sequence, ENGL 103, and a natural science requirement.

Change of Major into Pre-Business

Students who change majors into Pre-Business must have completed at least 12 credit hours at Clemson and must have a 2.0 minimum cumulative grade-point ratio.

Freshman Curriculum

First Semester

- 1 - BUS 101 Business Foundations¹
- 3 - ECON 211 Principles of Microeconomics¹
- 3 - MTHSC 102 Intro. to Math. Analysis^{1,2} or
 - 4 - MTHSC 106 Calculus of One Variable^{1,2}
- 3 - PSYCH 201 Introduction to Psychology or
 - 3 - SOC 201 Introduction to Sociology
- 4 - Natural Science Requirement^{1,3}
- 1 - Elective
- 15

Second Semester

- 3 - COMM 150 Intro. to Human Comm. or
 - 3 - COMM 250 Public Speaking
- 3 - ECON 212 Principles of Macroeconomics¹
- 3 - ENGL 103 Accelerated Composition¹
- 3 - MTHSC 207 Multivariable Calculus^{1,2} or
 - 4 - MTHSC 108 Calculus of One Variable II^{1,2}
- 3 - Science and Tech. in Society Requirement³
- 15

¹Freshman core curriculum class. Students must complete core classes before submitting a change-of-major request from Pre-Business to a business major.

²The following sequences are acceptable: MTHSC 102/207, 106/108, 106/207. For each of the four-credit-hour courses taken, one credit will be applied toward the elective credit-hour requirement.

³See General Education Requirements.

Admission to Business Degree Programs

To be eligible for admission into the Bachelor of Science degree programs in Accounting, Economics, Financial Management, or Management, students must have completed the courses outlined in the freshman core curriculum and have a cumulative grade-point ratio of 2.0 or higher. Students wishing to enter the Marketing Program must have completed the freshman core curriculum and have a Clemson/Bridge cumulative grade-point ratio of 3.0 or higher.

Students should initiate a change-of-major request with the College of Business and Behavioral Science Academic Advising Center in G-01 Sirrine Hall after completing the freshman core curriculum. Students who fail to meet the requirements for admission to a degree-granting business program may remain in Pre-Business until those requirements are met, but only until 64 semester hours of coursework have been completed. Students who exceed 64 credit hours and still do not meet the requirements for admission into a degree program must declare another major.

BEHAVIORAL AND SOCIAL SCIENCE PROGRAMS

Bachelor of Arts degrees are offered in Economics, Political Science, Psychology, and Sociology. Bachelor of Science degrees are also offered in Political Science, Psychology, and Sociology. These programs are designed to meet the needs of students seeking a broad general education as preparation for intelligent citizenship, commercial and industrial life, government service, research, and teaching. These curricula also provide an excellent background for the study of law, journalism, and medicine.

To achieve depth as well as breadth in the educational experience, students select a major consisting of courses above the sophomore level. Students also choose a minor consisting of additional credit hours. Students should contact their advisor for additional information and approval before pursuing a minor. See page 86 for a list of acceptable minors.

Students in Bachelor of Arts programs who plan to teach in public schools may elect education courses required for certification by the South Carolina State Department of Education. Such courses are to be approved by their own department advisors.

ROTC PROGRAMS

Aerospace Studies (AFROTC)

Air Force Reserve Officer Training Corps (AFROTC) is designed to "develop the best Air Force leaders and citizens of character, dedicated to serving the Nation." Students can earn a minor in Aerospace Studies and a commission as second lieutenants while pursuing a bachelor's degree. Clemson's program has been recognized as best in the nation and includes courses in air power history, written and oral communications, leadership and management, and political science. In addition to courses, students participate in a weekly leadership laboratory. "Lead Lab" provides students a training environment to practice leadership principles in a cadet-led Air Force wing. The first year of the program consists of *Foundations of the United States Air Force*, which introduces students to AFROTC and the Air Force: how it is organized, how it works, and how college students can "try out" the program to see if the Air Force is right for them. The second year involves *The Evolution of USAF Air and Space Power*, which explores the development and milestones of aerospace power—from balloons to the most advanced systems of today. The third year, *Air Force Leadership Studies*, teaches leadership skills and personal strengths and weaknesses as applied in an Air Force environment; the responsibility and authority of an Air Force officer; ethical behavior; and the application of listening, speaking, and writing skills in Air Force-specific formats and situations with accuracy, clarity, and appropriate style. In the fourth year, *National Security Affairs and Preparation for Active Duty*, students learn to examine the national security process, regional studies, advanced leadership ethics, Air Force doctrine, the military as a profession, officership, military justice, preparation for active duty, and current issues affecting military professionalism. Within this structure, continued emphasis is given to refining communication skills. Additional information is available from the department of Aerospace Studies.

Military Leadership (Army ROTC)

Army Reserve Officer Training Corps (Army ROTC) is all about leadership. It allows students the opportunity to become Army officers in the Reserves, National Guard, or active Army. The first two years of the program are open to all students. During the freshman year, the focus is on learning individual leadership skills, such as time management, leadership character, values, setting goals, and conducting meetings. The sophomore year emphasizes teamwork, team leading, communication/briefings, decision making, organizational culture, vision, and team values. Juniors primarily learn planning and conducting training for large groups and are evaluated in leadership exercises. Seniors focus on organizational leadership. They plan and run the 170-person organization, conduct individual counseling, and evaluate the juniors' leadership exercises. A minor in Military Leadership can be earned by completing the program. Enrollment requires no military obligation until the sophomore year for those on an Army scholarship or the junior year for those without a scholarship. Additional information is available from the Military Leadership Department.

ACCOUNTING

Bachelor of Science

The program leading to the Bachelor of Science degree in Accounting prepares students for careers as professional accountants. Students completing this program are well prepared to begin professional careers in corporate accounting or internal auditing or to continue study at the graduate level.

Students planning to become Certified Public Accountants should note that the requirements for certification in South Carolina include 150 hours of collegiate education and completion of a bachelor's degree. Other states have similar requirements. The Accounting faculty of the School of Accountancy and Finance believes these requirements are best met with a bachelor's degree in Accounting and completion of the Master of Professional Accountancy (MPAcc) degree program. The MPAcc program also enhances the preparation of students pursuing accounting careers in areas of specialization such as assurance services and taxation.

Admission to the MPAcc program is separate from admission to the undergraduate program. It is based on the student's undergraduate record and score on the Graduate Management Admissions Test (GMAT). For information, contact the School of Accountancy and Finance, 301 Sirrine Hall.

In addition to accounting and business courses, the Bachelor of Science curriculum is devoted to English, public speaking, mathematics, natural and social sciences, and the humanities. Thus, students in the accounting program obtain a broad-based education that not only gives them accounting expertise but also contributes to their proficiency in analytical, communication, and interpersonal skills. Along with the general business accreditation held by the College, the Accounting degree programs offered by the School of Accountancy and Finance are separately accredited by AACSB International, the only accrediting agency for accounting programs.

Students wishing to change majors into the accounting program must have a 2.0 or higher Clemson/Bridge cumulative grade-point ratio.

Sophomore Year

First Semester

- 3 - ACCT 201 Financial Accounting Concepts
- 3 - EX ST 301 Introductory Statistics *or*
3 - MTHSC 309 Intro. Business Statistics
- 3 - MGT 201 Principles of Management
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 3 - International Studies Requirement²

15

Second Semester

- 1 - ACCT 204 Accounting Procedures
- 3 - CP SC 220 Microcomputer Applications
- 3 - MGT 310 Intermediate Business Statistics
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - International Studies Requirement²
- 3 - Elective

16

Junior Year

First Semester

- 3 - ACCT 311 Intermediate Financial Acct. I
- 3 - ACCT 322 Accounting Information Systems
- 3 - ENGL 304 Business Writing
- 3 - FIN 311 Financial Management I
- 3 - Fine Arts Requirement³

15

Second Semester

- 3 - ACCT 312 Intermediate Financial Acct. II
- 3 - ACCT 340 Internal Auditing Theory⁴ *or*
3 - ACCT 415 Auditing⁴
- 3 - FIN 312 Financial Management II
- 3 - LAW 322 Legal Environment of Business
- 3 - PHIL 344 Business Ethics
- 1 - Elective

16

Senior Year

First Semester

- 3 - ACCT 303 Cost Accounting
- 3 - ACCT 313 Intermediate Financial Acct. III
- 3 - ACCT 404 Individual Taxation⁴ *or*
3 - ACCT 406 Business Taxation⁴
- 3 - MKT 301 Principles of Marketing
- 3 - International Business Requirement⁵

15

Second Semester

Option A: Internship⁶

- 3 - ACCT 399 Internship in Accounting⁶
- 3 - ACCT 410 Budgeting and Executive Control
- 3 - MGT 415 Business Strategy
- 6 - Business Requirement⁷

15

Option B: Business Management

- 3 - ACCT 410 Budgeting and Executive Control
- 3 - MGT 415 Business Strategy
- 9 - Business Requirement⁷

15

122 Total Semester Hours

See General Education Requirement. Note: Cases & Clinical Awareness Requirement may be satisfied by other General Education courses, by the International Studies Requirement or through the use of elective hours.

See advisor

A A H 210, M U S I C 210, or T H E A 210

⁴Students planning to pursue the Master of Professional Accountancy degree program should take ACCT 404 and 415. Students planning to work in industry upon completion of the degree program should take ACCT 340 and 406.

ECON 310, FIN 411, LAW 420, MGT 423, or MKT 427

⁶Internship may be completed in the summer between junior and senior years with ACCT 410, MGT 415, and six hours of Business Requirement completed in the second semester of the senior year, or internship may be completed in the second semester of the senior year with ACCT 410, MGT 415, and six hours of Business Requirement completed during the summer sessions.

ACCT 340, any 400-level ACCT course, ECON 302, (MGT) 306, FIN 304, 305, 308, 402, 404, MGT 390, 411, 452, or 456

Note: At least 50 percent of the total credits taken in ACCT, ECON, FIN, LAW, MGT, and MKT must be taken at Clemson University.

ECONOMICS

A bachelor's degree in Economics provides a thorough understanding of business, society, and public policy and prepares students for a wide range of careers. By combining general education courses and a strong course of study in economics, students can prepare for graduate studies in business, law, or any of the social sciences, as well as for careers in business and government.

The Department of Economics offers two undergraduate degree paths. The Bachelor of Arts degree emphasizes foreign language skills and offers students maximum freedom to tailor their course of study to their specific interests and career goals. A broad choice of minors is available for this program. The Bachelor of Arts program requires 30 credit hours in economics, which should be satisfied by completing ECON 211, 212, and 24 credits of coursework above the sophomore level. Bachelor of Arts majors must complete ECON 314 and 315. ECON 405 is strongly recommended but not required.

The Bachelor of Science program emphasizes business applications. It requires 31 credit hours in economics, which should be satisfied by completing ECON 211, 212, and 25 credits of coursework above the sophomore level. Bachelor of Science majors must complete ECON 405 in addition to 314 and 315. Students wishing to change majors into the Bachelor of Science program in Economics must have a 2.0 or higher Clemson/Bridge cumulative grade-point ratio.

Minors

A minor field is required of students in both the Bachelor of Arts and the Bachelor of Science degree programs. Economics majors may choose, in consultation with their advisors, any University-approved minor (see page 86).

Students who wish to combine the curriculum in Economics with secondary-school teaching should take the degree in Education with a teaching area in Economics. The courses taken will be those required for teaching certification as specified by the South Carolina Department of Education, as well as those required for an Economics major.

Combined Bachelor's/Master's Plan

The Department of Economics allows students to count up to 12 hours of graduate credit (800-level courses) toward both the bachelor's and master's degrees. Students participating in this program must have a minimum grade-point ratio of 3.4 and be admitted to the Graduate School prior to registering for graduate courses. Details of the suggested curriculum and program information are available from the Department of Economics.

Dual Degree Program with Université Catholique de Louvain in Belgium

The Economics Department has a dual degree program with the Université Catholique de Louvain in Belgium. Students spend one semester taking courses at the University of Maastricht in The Netherlands and two semesters at UCL in Louvain la Neuve, Belgium. The instruction at Maastricht is in English, and the instruction at UCL is in French. After returning to Clemson to complete their studies, students will earn bachelor degrees from both Clemson and UCL. Students must be proficient in French to participate in the program. Interested students should contact the Department of Economics for information.

Change of Major into Bachelor of Arts in Economics

Students who change majors into Bachelor of Arts in Economics must have completed at least 12 credit hours at Clemson and must have a 2.0 minimum Clemson/Bridge cumulative grade-point ratio.

Bachelor of Arts

Freshman Year

First Semester

- 3 - ECON 211 Principles of Microeconomics
- 3 - MTHSC 102 Intro. to Mathematical Analysis¹
- 3 - Foreign Language Requirement²
- 4 - Natural Science Requirement³
- 2 - Elective
- 15

Second Semester

- 3 - ECON 212 Principles of Macroeconomics
- 3 - ENGL 103 Accelerated Composition
- 3 - MTHSC 207 Multivariable Calculus¹
- 3 - Foreign Language Requirement²
- 3 - Science and Tech. in Society Requirement⁴
- 15

Sophomore Year

First Semester

- 3 - ECON 314 Intermediate Microeconomics
- 3 - MTHSC 301 Statistical Methods I
- 3 - Arts and Humanities (Literature) Requirement³
- 3 - Arts and Humanities (Non-Lit.) Requirement³
- 3 - Elective
- 15

Second Semester

- 3 - ECON 315 Intermediate Macroeconomics
- 3 - HIST 173 The West and the World II
- 3 - Cross-Cultural Awareness Requirement⁴
- 3 - Minor Requirement
- 3 - Elective
- 15

Junior Year

First Semester

- 3 - COMM 150 Intro. to Human Comm. or
- 3 - COMM 250 Public Speaking
- 3 - Major Requirement⁵
- 3 - Minor Requirement
- 6 - Elective
- 15

Second Semester

- 6 - Major Requirement⁵
- 3 - Minor Requirement
- 6 - Elective
- 15

Senior Year

First Semester

- 6 - Major Requirement⁵
- 3 - Minor Requirement
- 6 - Elective
- 15

Second Semester

- 3 - Major Requirement⁵
- 3 - Minor Requirement
- 9 - Elective
- 15

120 Total Semester Hours

¹The following sequences are also acceptable: MTHSC 106/108; and MTHSC 106/207.

²Two semesters (through 202) in the same modern foreign language are required.

³See General Education Requirements.

⁴See General Education Requirements. This requirement may be satisfied by other courses in the curriculum. In this case, elective hours must be substituted.

⁵Three credit hours must be selected from ECON 344, 350, 360, 402, 404, 410, 424, 426, 435, 455. Note: Only ECON courses numbered 316 and above may be used to satisfy the Major Requirement.

ECONOMICS

Bachelor of Science

Sophomore Year

First Semester

- 3 - ACCT 201 Financial Accounting Concepts¹
- 3 - ECON 314 Intermediate Microeconomics
- 3 - EX ST 301 Introductory Statistics or
- 3 - MTHSC 309 Intro. Business Statistics
- 3 - MGT 201 Principles of Management
- 3 - International Studies Requirement²
- 15

Second Semester

- 3 - ACCT 202 Managerial Accounting Concepts
- 3 - ECON 315 Intermediate Macroeconomics
- 3 - Arts and Humanities (Literature) Requirement³
- 3 - Arts and Humanities (Non-Lit.) Requirement³
- 3 - International Studies Requirement²
- 15

Junior Year

First Semester

- 4 - ECON 405 Introduction to Econometrics
- 3 - FIN 306 Corporation Finance⁴
- 3 - Major Requirement⁵
- 3 - Minor Requirement
- 3 - Elective
- 16

Second Semester

- 3 - Major Requirement⁵
- 6 - Minor Requirement
- 6 - Elective
- 15

Senior Year

First Semester

- 3 - Major Requirement⁵
- 3 - Minor Requirement
- 9 - Elective
- 15

Second Semester

- 6 - Major Requirement⁵
- 3 - Minor Requirement
- 5 - Elective
- 14

120 Total Semester Hours

¹Students who complete a minor in Accounting must complete three hours of electives to replace the ACCT 201 requirement in the Economics major.

²See advisor.

³See General Education Requirements. Note: Cross-Cultural Awareness Requirement may be satisfied by other General Education courses, by the International Studies Requirement, or through the use of elective hours.

⁴Students who complete a minor in Financial Management must complete three hours of electives to replace the FIN 306 requirement in the Economics major.

⁵Three credit hours must be selected from ECON 344, 350, 360, 402, 404, 410, 424, 426, 435, 455. Note: Only ECON courses numbered 316 and above may be used to satisfy the Major Requirement.

Note: At least 50 percent of the total credits taken in ACCT, ECON, FIN, LAW, MGT, and MKT must be taken at Clemson University.

FINANCIAL MANAGEMENT

Bachelor of Science

The Bachelor of Science in Financial Management program is designed to develop an understanding of financial markets in the contemporary economy, the operation of financial institutions, and the financial management of business operations. The curriculum prepares students for careers in such areas as corporate finance, banking, investments, financial planning, insurance, and real estate. Governments of all levels also employ finance graduates in many of their divisions. The curriculum also provides excellent preparation for students interested in graduate studies or law school.

The core of the curriculum provides a broad range of subjects with an emphasis on technical and communication skills. Students then have the flexibility to tailor courses to their own needs by choosing emphasis areas that will enhance career preparation in specific areas of finance. Students who complete a specific set of courses are eligible to sit for the certified financial planner (CFP®) examination.

Students wishing to change majors into the financial management program must have a 2.0 or higher Clemson/Bridge cumulative grade-point ratio.

Sophomore Year

First Semester

- 3 - ACCT 201 Financial Accounting Concepts
- 3 - EX ST 301 Introductory Statistics or
 - 3 - MTHSC 309 Intro. Business Statistics
- 3 - MGT 201 Principles of Management
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 3 - International Studies Requirement²

15

Second Semester

- 1 - ACCT 204 Accounting Procedures
- 3 - CP SC 220 Microcomputer Applications or
 - 3 - MGT 218 Mgt. Personal Computer Appl.
- 3 - MGT 310 Intermediate Business Statistics
- 3 - MKT 301 Principles of Marketing
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - International Studies Requirement²

16

Junior Year

First Semester

- 3 - ACCT 311 Intermediate Financial Acct. I
- 3 - ENGL 304 Business Writing
- 3 - FIN 311 Financial Management I
- 3 - LAW 322 Legal Environment of Business
- 3 - Elective

15

Second Semester

- 3 - ACCT 312 Intermediate Financial Acct. II
- 3 - FIN 305 Investment Analysis
- 3 - FIN 307 Principles of Real Estate
- 3 - FIN 312 Financial Management II
- 3 - Elective

15

Senior Year

First Semester

- 3 - ACCT 303 Cost Accounting
- 3 - ACCT 313 Intermediate Financial Acct. III
- 3 - FIN 308 Financial Institutions and Markets
- 6 - Emphasis Area Requirement³

15

Second Semester

- 3 - MGT 415 Business Strategy
- 9 - Emphasis Area Requirement³
- 3 - Elective

15

121 Total Semester Hours

¹See General Education Requirements. Note: Cross-Cultural Awareness Requirement may be satisfied by other General Education courses, by the International Studies Requirement, or through the use of elective hours.

²See advisor.

³Fifteen credit hours from one of the following emphasis areas are required. Emphasis area should be selected before the end of the junior year in consultation with the advisor:

Corporate Finance—FIN 402, 404, 411; plus two courses from FIN 304, 399 (three credits), 405, 406, 408 (One accounting course may substitute for FIN 304, 399, 405, 406, or 408.) Accounting courses may be selected from any 300- or 400-level courses offered by the School of Accountancy. Credit may not be received for both ACCT 303 and 307.

Financial Planning—ACCT 404, 408, FIN 304, 405, 409

Financial Services—FIN 405, 406, 408, 411, and one course from FIN 304, 399 (three credits), 417

Real Estate—FIN 415, 416, 417, LAW 333, plus one course from FIN 399 (three credits), 408, LAW 405

Notes:

1. Financial Management majors are required to have a minimum grade-point ratio of 2.0 in all FIN-designated courses to graduate. Only the last grade for courses that are repeated is used in computing this grade-point ratio.

2. At least 50 percent of the total credits taken in ACCT, ECON, FIN, LAW, MGT, and MKT must be taken at Clemson University.

GRAPHIC COMMUNICATIONS

Bachelor of Science

The Bachelor of Science degree in Graphic Communications prepares students for professional careers in printing, publishing, packaging, and related industries. The core curriculum assures graduates of having the skills and knowledge required by most entry-level jobs. The major requirements allow each student to select courses that enhance career preparation in specific segments of graphic communications. Coursework is heavily oriented around individual laboratory performance, which stresses the development of problem-solving skills in a broad cross-section of manufacturing areas. Applications include all major processes and a variety of industry segments, including commercial printing, publishing, package production, specialty printing, and industrial applications of printing technology beyond communications. The most common career opportunities are in printing management, production planning and supervision, and commercial and technical sales.

The Graphic Communications program is designed to be completed in four years (eight semesters and one or two summers). While students must take one internship during a fall or spring semester, one or two summers are typically used to make up for that semester. The department schedules courses in summers for that purpose. Taking a reduced load per term or other circumstances could extend the time needed to meet graduation requirements.

Policy on Advancement in Graphic Communications

Graphic Communications majors must earn a C or better in prerequisite G C courses before enrolling in the next level G C course. Registration priority is given to those students for whom the course is a requirement.

Change of Major into Graphic Communications

Students who change majors into Graphic Communications must have completed at least 12 credit hours at Clemson, must have a 2.0 minimum cumulative grade-point ratio, and must have earned a B or better in G C 102.

Freshman Year

First Semester

- 1 - G C 101 Orientation to Graphic Comm.
- 4 - G C 102 Foundations in Graphic Comm.
- 3 - PSYCH 201 Introduction to Psychology
- 4 - Approved Laboratory Science Requirement
- 3 - Major Requirement

15

Second Semester

- 3 - ENGL 103 Accelerated Composition
- 3 - EX ST 301 Introductory Statistics or
 - 3 - MTHSC 301 Statistical Methods I or
 - 3 - MTHSC 309 Intro. Business Statistics
- 4 - G C 104 Graphic Communications I
- 2 - PKGSC 102 Intro. to Packaging Science
- 4 - Approved Laboratory Science Requirement

16

Sophomore Year

First Semester

- 3 - ACCT 201 Financial Accounting Concepts
- 4 - G C 207 Graphic Communications II
- 3 - G C 215 Photographic and Digital Imaging Techniques
- 3 - MGT 201 Principles of Management
- 3 - Arts and Humanities (Literature) Requirement

16

Second Semester

- 3 - ACCT 202 Managerial Accounting Concepts
- 3 - COMM 250 Public Speaking
- 3 - ECON 200 Economic Concepts or
 - 3 - ECON 211 Principles of Microeconomics
- 3 - EN SP 200 Intro. to Environmental Science
- 4 - G C 310 Applied Principles of Electronic Workflow

16

Summer

- 0 - CO-OP 201 Cooperative Education⁴
- 1 - G C 350 Graphic Comm. Internship I⁴

1

Junior Year

First Semester

- 4 - G C 440 Commercial Printing
- 3 - MKT 301 Principles of Marketing
- 3 - Arts and Humanities (Non-Lit.) Requirement
- 3 - Major Requirement
- 1 - Elective

14

Second Semester

- 3 - ENGL 314 Technical Writing
- 4 - G C 406 Package and Specialty Printing
- 3 - G C 446 Ink and Substrates
- 3 - Major Requirement²
- 2 - Elective

15

Summer

- 0 - CO-OP 202 Cooperative Education⁴
- 1 - G C 450 Graphic Comm. Internship II⁴

1

Senior Year

First Semester

- 4 - G C 444 Current Dev. and Trends in GC
- 3 - MGT 307 Human Resource Management or
3 - PSYCH 364 Industrial Psychology
- 6 - Major Requirement²
- 1 - Elective

14

Second Semester

- 3 - G C 448 Planning and Controlling Printing
Functions
- 2 - G C 480 Senior Seminar in Graphic Comm.
- 3 - Major Requirement²
- 6 - Elective

14

122 Total Semester Hours

¹Must include four credit hours in chemistry (CH 101 or 105) and four credit hours in physics (PHYS 122/124 or 207/209).

²Must be approved prior to registration. See advisor.

³Select any ENGL course from General Education Arts and Humanities (Literature) Requirement.

⁴One internship must be in a fall or spring semester (summer—at least 12 weeks; fall/spring—at least 15 weeks). G C 455 will not substitute for 450.

⁵See General Education Requirements. This course or three elective credit hours must also satisfy the Cross-Cultural Awareness Requirement.

MANAGEMENT

Bachelor of Science

The Bachelor of Science degree in Management prepares students for careers as professional managers in corporations, governmental organizations, and small businesses. In addition, the program provides a foundation for graduates who wish to pursue advanced degrees in business and public administration, law, and the social sciences.

The curriculum gives students a broad exposure to the functional areas of business and allows each to select an emphasis area in a subject that is germane to individual career interests. The Management curriculum provides an examination of the social, legal, political, and economic environments in which organizations must operate; an understanding of the functional areas of business and their interrelationships; and a knowledge of behavioral science, applied statistics, and mathematics as they relate to organizational problem solving. The program is accredited by AACSB International.

Students wishing to change majors into the management program must have a 2.0 or higher Clemson/Bridge cumulative grade-point ratio.

Sophomore Year

First Semester

- 3 - ACCT 201 Financial Accounting Concepts
- 3 - EX ST 301 Introductory Statistics or
3 - MTHSC 309 Intro. Business Statistics
- 3 - MGT 201 Principles of Management¹
- 3 - Arts and Humanities (Non-Lit.) Requirement²
- 3 - International Studies Requirement³

15

Second Semester

- 3 - ACCT 202 Managerial Accounting Concepts
- 3 - MGT 218 Mgt. Personal Computer Appl.
- 3 - MGT 310 Intermediate Business Statistics¹
- 3 - Arts and Humanities (Literature) Requirement²
- 3 - International Studies Requirement³

15

Junior Year

First Semester

- 3 - MGT 318 Management of Information Systems¹
- 3 - MGT 390 Operations Management¹
- 3 - MKT 301 Principles of Marketing
- 3 - Emphasis Area Requirement^{1,4}
- 3 - Support Area Requirement⁵

15

Second Semester

- 3 - LAW 322 Legal Environment of Business
- 3 - MGT 307 Human Resource Management¹ or
3 - MGT 400 Mgt. of Organizational Behavior¹
- 3 - MGT 312 Decision Models for Management¹
- 3 - Emphasis Area Requirement^{1,4}
- 3 - Support Area Requirement⁵

15

Senior Year

First Semester

- 3 - FIN 306 Corporation Finance
- 3 - Emphasis Area Requirement^{1,4}
- 6 - Support Area Requirement⁵
- 3 - Elective

15

Second Semester

- 3 - MGT 415 Business Strategy¹
- 3 - MGT 423 International Business Management¹
- 3 - Emphasis Area Requirement^{1,4}
- 3 - Support Area Requirement⁵
- 3 - Elective

15

120 Total Semester Hours

¹Grade of C or better in this course is required for graduation.

²See General Education Requirements. Note: Cross-Cultural Awareness Requirement may be satisfied by other General Education courses, by the International Studies Requirement, or through the use of elective hours.

³See advisor for approved list of qualifying courses. One course may also satisfy the Cross-Cultural Awareness Requirement. See footnote 2 above.

⁴Management majors must complete an emphasis area consisting of twelve hours beyond the coursework required by the management curriculum and the support area requirement. Students should choose ONE of the following ways to satisfy this requirement:

Entrepreneurship—MKT (E L E) 314, MGT (E L E) 315, plus two courses from E L E 301, 401, 499, ECON (E L E) 321, SOC (E L E, PO SC, PSYCH) 356, MGT 497

Human Resources Management—Any of the following courses, including at least two management courses not already taken in the basic curriculum: MGT 307, 400, 416, 425, 431, 435, 436, PSYCH 364, 368, 369, 435, 457, 459, 471

International Management—Any four of the following courses: ECON 310, FIN 411, LAW 420, L&IT 401, MGT 424, MKT 427, PO SC 361, 362, 367, 429, and any business courses approved in advance and taken overseas as part of a study abroad experience

Management Information Systems—MGT 411, 452; and two courses from CP SC 462, MGT 430 (topic must be approved in advance by advisor), 454, 455, 456

Operations Management—MGT 402; and two courses from MGT 408, 411, 427; and one course from MGT 404, 412, 444, 452

Supply Chain Management—MGT 412, 424; and two courses from MGT 305, 317, 402, 408, 427, 444, MKT 426

General Management—Any four 300- or 400-level management courses

⁵Management majors must complete a support area consisting of fifteen hours beyond the coursework required by the management curriculum and the management emphasis area requirement. Students should choose ONE of the following three ways to satisfy this requirement: (1) Declare and complete a minor requiring AT LEAST 15 hours of additional coursework; or (2) Complete 15 hours of coursework selected from the approved list of management support courses; or (3) Complete five courses from the same foreign language: 201, 202, 305; and any two other courses at the 300 or 400 level (CHIN, FR, GER, ITAL, JAPN, RUSS, or SPAN)

Note: At least 50 percent of the total credits taken in ACCT, ECON, E L E, FIN, LAW, MGT, and MKT must be taken at Clemson University.

MARKETING

Bachelor of Science

The Bachelor of Science degree program in Marketing develops an understanding of various aspects of marketing. The curriculum prepares students for professional marketing careers in industry, government, or the nonprofit sector. Graduates are also well prepared for entrance into the Master of Business Administration, law, or other graduate programs. For students who want a general perspective of marketing, the curriculum provides a broad range of subjects with the flexibility to tailor courses by choosing areas that enhance career preparation in various areas of marketing. Subjects include promotional strategy, professional selling, sales management, public and nonprofit marketing, entrepreneurship, marketing research, product management, marketing management, and international marketing. Emphasis areas in services marketing, sport marketing, and technical marketing are available to students who seek to specialize. The Marketing curriculum, whether approached from a general or specialized perspective, provides the conceptual, quantitative, and analytical skills necessary to function in a dynamic business environment. The Marketing degree is accredited by AACSB International.

Students wishing to change majors into the Marketing program must have a Clemson/Bridge cumulative grade-point ratio of 3.0 or higher.

Sophomore Year

First Semester

- 3 - ACCT 201 Financial Accounting Concepts
- 3 - EX ST 301 Introductory Statistics or
3 - MTHSC 309 Intro. Business Statistics
- 3 - MGT 201 Principles of Management
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 3 - International Studies Requirement²

15

Second Semester

- 3 - ACCT 202 Managerial Accounting Concepts
- 3 - MGT 310 Intermediate Business Statistics
- 3 - MKT 301 Principles of Marketing
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - International Studies Requirement²

15

Junior Year

First Semester

- 3 - ENGL 304 Business Writing
 - 3 - LAW 322 Legal Environment of Business
 - 3 - MKT 302 Consumer Behavior
 - 3 - MKT 431 Marketing Research
 - 3 - Support Course Requirement¹
-
- 15

Second Semester

- 3 - FIN 306 Corporation Finance
 - 3 - MKT 427 International Marketing
 - 3 - Emphasis Area Requirement⁴
 - 3 - Support Course Requirement¹
 - 4 - Elective
-
- 16

Senior Year

First Semester

- 3 - MGT 415 Business Strategy
 - 3 - MKT 420 Professional Selling
 - 3 - Emphasis Area Requirement⁴
 - 3 - Support Course Requirement¹
 - 3 - Elective
-
- 15

Second Semester

- 3 - MKT 450 Strategic Marketing Management
 - 3 - Emphasis Area Requirement⁴
 - 6 - Support Course Requirement¹
 - 3 - Elective
-
- 15

121 Total Semester Hours

¹See General Education Requirements. Note: Cross-Cultural Awareness Requirement may be satisfied by other General Education courses, by the International Studies Requirement, or through the use of elective hours.

²See advisor.

³Chosen jointly by the student and the advisor. These must support the emphasis area selected by the student. Certain minors may be used to satisfy the Support Courses Requirement. See advisor.

⁴Select one of the following emphasis areas:

General Marketing—any three MKT courses at the 300 or 400 level

Services Marketing—MKT 428 plus any two additional MKT courses at the 300 or 400 level

Sport Marketing—MKT 321 plus any two additional MKT courses at the 300 or 400 level

Technical Marketing—MKT 426 plus any two additional MKT courses at the 300 or 400 level

Note: At least 50 percent of the total credits taken in ACCT, ECON, FIN, LAW, MGT, and MKT must be taken at Clemson University.

POLITICAL SCIENCE

The Department of Political Science offers two degree programs: a Bachelor of Arts and a Bachelor of Science, each requiring a total of 120 credit hours. Both prepare students for a wide range of graduate programs and career opportunities. The Bachelor of Arts program provides broad coverage of the political science discipline and emphasizes communication skills and humanities. The Bachelor of Science program is recommended for those with an aptitude for mathematics and/or an interest in political economy, public administration, public policy, or other fields requiring advanced quantitative skills. Both programs are appropriate for pre-law students and for students interested in either American or global politics. Note that the Bachelor of Arts degree requires a minor, and the Bachelor of Science degree requires a field of concentration and, depending on the concentration, requires or allows a minor.

Bachelor of Arts

The requirements for a Bachelor of Arts degree in Political Science consist of PO SC 101, 102 or 104, 199, 499, and at least 24 additional credit hours in political science at the 300-400 level, including at least one course from each of the following fields:

American Government—PO SC 403, 405, 416, 436, 442

Comparative Politics—PO SC 371, 372, 466, 471, 476, 477, 478

International Relations—PO SC 361, 362, 363, 375, 429

Political Theory—PO SC 450, 453, 455

Public Policy and Public Administration—PO SC 302, 321, 421, 423, 424

The student's additional coursework in political science is chosen with the consent and advice of the departmental advisor to ensure an appropriate balance of breadth and specialization within the field of political science. In addition to the courses listed above, the department offers a wide range of specialized courses in each of the subfields of the political science discipline.

The Bachelor of Arts degree in Political Science also requires additional arts and humanities courses beyond the basic General Education Requirements.

Note: No more than three hours credit from PO SC 310, 311, 312, 409, and 410 may be applied toward a Political Science major

Freshman Year

First Semester

- 3 - PO SC 101 American National Government
 - 1 - PO SC 199 Introduction to Political Science
 - 3 - Foreign Language Requirement¹
 - 3 - History Requirement²
 - 3 - Mathematics Requirement³
 - 1 - Elective
-
- 14

Second Semester

- 3 - ENGL 103 Accelerated Composition
 - 3 - PO SC 102 Intro. to International Relations or
3 - PO SC 104 Intro. to Comparative Politics
 - 3 - Foreign Language Requirement
 - 3 - History Requirement
 - 4 - Natural Science Requirement
-
- 16

Sophomore Year

First Semester

- 3 - Arts and Humanities (Literature) Requirement⁴
 - 3 - Major Requirement⁴
 - 3 - Mathematics or Natural Science Requirement⁴
 - 3 - Oral Communication Requirement⁴
 - 3 - Elective
-
- 15

Second Semester

- 3 - Arts and Humanities (Literature) Requirement⁴
 - 3 - Arts and Humanities (Non-Lit.) Requirement⁴
 - 3 - Major Requirement⁴
 - 3 - Minor Requirement⁵
 - 3 - Science and Tech. in Society Requirement¹
-
- 15

Junior Year

First Semester

- 3 - ECON 211 Principles of Microeconomics
 - 3 - Major Requirement⁴
 - 3 - Minor Requirement⁵
 - 6 - Elective
-
- 15

Second Semester

- 3 - ECON 212 Principles of Macroeconomics
 - 3 - Major Requirement⁴
 - 3 - Minor Requirement⁵
 - 3 - Philosophy/Religion Requirement⁶
 - 3 - Elective
-
- 15

Senior Year

First Semester

- 1 - PO SC 499 Professional Dev. in Political Sci.
 - 3 - Fine Arts Requirement⁷
 - 6 - Major Requirement⁴
 - 3 - Minor Requirement⁵
 - 2 - Elective
-
- 15

Second Semester

- 6 - Major Requirement⁴
 - 3 - Minor Requirement⁵
 - 6 - Elective
-
- 15

120 Total Semester Hours

Six hours (through 202) in the same modern foreign language are required.

¹HIST 101, 102, 172, 173, 193

²See General Education Requirements (Note: Students selecting MTHSC 106 and 108 will take fewer elective hours.)

³See major requirements in program description above

⁴See list of approved minors on page 86.

⁵Any course in philosophy or religion not already used to satisfy a General Education Requirement

⁶Any course in A A H, ART, DANCE, MUSIC, or THEA not already used to satisfy a General Education Requirement

POLITICAL SCIENCE

Bachelor of Science

The requirements for a Bachelor of Science degree in Political Science consist of PO SC 101, 102 or 104, and at least 24 additional credit hours in political science at the 300-400 level, including one upper-level American politics course and one upper-level global politics course.

In consultation with the departmental advisor, students choose one of the following concentrations: American Politics, Global Politics, Political Economy, Public Administration, or Public Policy.

Note: No more than three hours credit from PO SC 310, 311, 312, 409, and 410 may be applied toward a Political Science major.

Freshman Year

First Semester

- 3 - PO SC 101 American National Government
- 1 - PO SC 199 Introduction to Political Science
- 3 - Foreign Language Requirement¹
- 3 - Mathematics Requirement²
- 4 - Natural Science Requirement³

14

Second Semester

- 3 - ENGL 103 Accelerated Composition
- 3 - PO SC 102 Intro. to International Relations or
3 - PO SC 104 Intro. to Comparative Politics
- 3 - Foreign Language Requirement¹
- 3 - Mathematics Requirement²
- 4 - Natural Science Requirement³

16

Sophomore Year

First Semester

- 3 - ECON 211 Principles of Microeconomics
- 3 - American Politics Requirement⁴
- 3 - Arts and Humanities (Non-Lit.) Requirement⁵
- 3 - Mathematics Requirement²
- 3 - Philosophy of Science Requirement⁶

15

Second Semester

- 3 - ECON 212 Principles of Macroeconomics
- 3 - Advanced Political Science Requirement⁷
- 3 - Arts and Humanities (Literature) Requirement⁵
- 3 - Global Politics Requirement⁸
- 3 - Elective

15

AMERICAN POLITICS CONCENTRATION

Junior Year

First Semester

- 3 - PO SC 341 Quantitative Methods in Pol. Sci.
- 3 - American Politics Requirement⁴
- 3 - Oral Communication Requirement⁵
- 3 - Philosophy/Religion Requirement⁹
- 3 - Elective

15

Second Semester

- 3 - American Politics Requirement⁴
- 3 - Minor Requirement¹⁰
- 3 - Science and Tech. in Society Requirement⁵
- 7 - Elective

16

Senior Year

First Semester

- 1 - PO SC 499 Professional Dev. in Political Sci.
- 3 - American Politics Requirement⁴
- 6 - Minor Requirement¹⁰
- 5 - Elective

15

Second Semester

- 3 - American Politics Requirement⁴
- 6 - Minor Requirement¹⁰
- 6 - Elective

15

121 Total Semester Hours

GLOBAL POLITICS CONCENTRATION

Junior Year

First Semester

- 3 - PO SC 341 Quantitative Methods in Pol. Sci.
- 3 - Global Politics Requirement⁸
- 3 - Oral Communication Requirement⁵
- 3 - Philosophy/Religion Requirement⁹
- 3 - Elective

15

Second Semester

- 3 - Global Politics Requirement⁸
- 3 - Minor Requirement¹⁰
- 3 - Science and Tech. in Society Requirement⁵
- 7 - Elective

16

Senior Year

First Semester

- 1 - PO SC 499 Professional Dev. in Political Sci.
- 3 - Global Politics Requirement⁸
- 6 - Minor Requirement¹⁰
- 5 - Elective

15

Second Semester

- 3 - Global Politics Requirement⁸
- 6 - Minor Requirement¹⁰
- 6 - Elective

15

121 Total Semester Hours

POLITICAL ECONOMY CONCENTRATION

Junior Year

First Semester

- 3 - ECON 314 Intermediate Microeconomics
- 3 - PO SC 341 Quantitative Methods in Pol. Sci.
- 3 - Oral Communication Requirement⁵
- 3 - Philosophy/Religion Requirement⁹
- 3 - Elective

15

Second Semester

- 3 - ECON 350 Moral and Ethical Aspects of a
Market Economy
- 3 - PO SC 448 Studies in Political Economy
- 3 - Science and Tech. in Society Requirement⁵
- 7 - Elective

16

Senior Year

First Semester

- 3 - PO SC 449 Political Theory of Capitalism
- 1 - PO SC 499 Professional Dev. in Political Sci.
- 3 - Advanced Political Science Requirement⁷
- 3 - Economics Requirement¹¹
- 6 - Elective

16

Second Semester

- 3 - ECON 360 Public Choice
- 3 - Advanced Political Science Requirement⁷
- 3 - Economics Requirement¹¹
- 6 - Elective

15

122 Total Semester Hours

PUBLIC ADMINISTRATION CONCENTRATION

Junior Year

First Semester

- 3 - PO SC 321 Public Administration
- 3 - PO SC 341 Quantitative Methods in Pol. Sci.
- 3 - Oral Communication Requirement⁵
- 3 - Philosophy/Religion Requirement⁹
- 3 - Elective

15

Second Semester

- 3 - Advanced Political Science Requirement⁷
- 6 - Public Administration Requirement¹²
- 3 - Science and Tech. in Society Requirement⁵
- 4 - Elective

16

Senior Year

First Semester

- 3 - PO SC 430 Public Policy Evaluation
- 1 - PO SC 499 Professional Dev. in Political Sci.
- 6 - Public Administration Requirement¹²
- 5 - Elective

15

Second Semester

- 3 - Political Science Requirement¹³
- 6 - Public Administration Requirement¹²
- 6 - Elective

15

121 Total Semester Hours

PUBLIC POLICY CONCENTRATION

Junior Year

First Semester

- 3 - PO SC 341 Quantitative Methods in Pol. Sci.
 - 3 - PO SC 421 Public Policy
 - 3 - Oral Communication Requirement⁵
 - 3 - Philosophy/Religion Requirement⁹
 - 3 - Elective
- 15

Second Semester

- 3 - Advanced Political Science Requirement⁷
 - 6 - Public Policy Requirement¹²
 - 3 - Science and Tech. in Society Requirement⁵
 - 4 - Elective
- 16

Senior Year

First Semester

- 3 - PO SC 430 Public Policy Evaluation
 - 1 - PO SC 499 Professional Dev. in Political Sci.
 - 6 - Public Policy Requirement¹²
 - 5 - Elective
- 15

Second Semester

- 3 - Advanced Political Science Requirement⁷
 - 6 - Public Policy Requirement¹²
 - 6 - Elective
- 15

121 Total Semester Hours

⁵Six hours (through 202) in the same modern foreign language are required.

⁷MTHSC 102 or 106; MTHSC 108 or 207; MTHSC 301 or 309 or EX ST 301

⁹See General Education Requirements. A two-semester sequence in the same science is required.

¹²PO SC 302, 321, 343, 381, 403, 405, 407, 416, 421, 423, 424, 427, 430, 436, 437, 438, 442, 453, 454, 455, 480, or 482

¹³See General Education Requirements. (Note: Arts and Humanities (Non-Literature) Requirement must be satisfied by a course in PHIL or REL.)

¹⁴PHIL 102, 225, 323, 325, or 327

¹⁵Any 300- or 400-level PO SC course

¹⁶PO SC 361, 362, 363, 367, 371, 372, 375, 428, 429, 456, 457, 459, 461, 466, 471, 472, 473, 476, 477, 478, or (LANG) 485

¹⁷Any course in PHIL or REL

¹⁸See list of approved minors on page 86.

¹⁹ECON 301, 302, 309, 310, 315, 319, 402, 404, 410, 412, 413, 419, 420, 422, 425, 427, 428, 440 or HIST 325, 327.

²⁰See advisor.

²¹PO SC 302, 363, 424, 428, or 429

PSYCHOLOGY

Psychology is the study of human and animal behavior and the biological, psychological, and social processes related to that behavior. The Bachelor's degree in Psychology prepares students for a variety of professional careers related to human resources, personnel, counseling, and other people-oriented positions in human services, business, and industry. Additionally, the Bachelor's degree provides excellent preparation for graduate training in such areas as clinical, counseling, industrial, experimental, cognitive, social, biological, health, developmental, and school psychology. The program also provides excellent preparation for students who intend to pursue professional training in medicine, physical or occupational therapy, dentistry, pharmacy, veterinary science, or law. Further information is available at www.clemson.edu/psych/.

Change of Major into Psychology

Students who change majors into Psychology must have completed at least 12 credit hours at Clemson or in the Bridge Program and must have a 2.4 minimum Clemson/Bridge cumulative grade-point ratio.

Bachelor of Arts

The Bachelor of Arts program requires PSYCH 201, 202, 309, 310, 492, and 19 additional credits selected from PSYCH 275 and/or 300-400-level psychology courses arranged as follows:

Two courses from the Biological and Cognitive menu: PSYCH 324, 333, 422

One course from each of the following menus:

Applied—PSYCH 275, 355, 364, 368, 375, 383, 435, 456, 480, 488

Individuals and Groups—PSYCH 340, 352, 370

Laboratory—PSYCH 325, 334, 423, 456, 471, H490, 493, 495, 496, 497, 498

At least six credits must be from 400-level psychology courses, with at least three of those credits from psychology courses numbered between 400 and 489. BIOSC 470 may be taken in lieu of one elective psychology course. Students satisfying both the Applied and Laboratory requirements with PSYCH 456 must still satisfy the requirement for 19 additional credits in Psychology (see above). Students should consult their advisors for other degree requirements and course recommendations.

Freshman Year

First Semester

- 3 - PSYCH 201 Introduction to Psychology
 - 1 - PSYCH 202 Introductory Psychology Lab.
 - 3 - Foreign Language Requirement
 - 3 - Mathematics Requirement²
 - 3 - Social Science Requirement¹
 - 2 - Elective
- 15

Second Semester

- 3 - ENGL 103 Accelerated Composition
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
 - 3 - Foreign Language Requirement
 - 3 - Major Requirement⁴
 - 3 - Mathematics Requirement²
- 15

Sophomore Year

First Semester

- 4 - PSYCH 309 Introductory Experimental Psych.
 - 3 - Arts and Humanities (Literature) Requirement¹
 - 3 - Cross-Cultural Awareness Requirement
 - 4 - Natural Science Requirement
 - 1 - Elective
- 15

Second Semester

- 4 - PSYCH 310 Advanced Experimental Psych.
 - 3 - Cross-Cultural Awareness Requirement
 - 4 - Natural Science Requirement
 - 4 - Elective
- 15

Junior Year

First Semester

- 4 - Major Requirement⁴
 - 3 - Minor Requirement⁶
 - 3 - Science and Tech. in Society Requirement¹
 - 6 - Elective
- 16

Second Semester

- 3 - Major Requirement⁴
 - 3 - Minor Requirement⁶
 - 3 - Oral Communication Requirement¹
 - 6 - Elective
- 15

Senior Year

First Semester

- 1 - PSYCH 492 Senior Laboratory in Psychology
 - 6 - Major Requirement⁴
 - 3 - Minor Requirement⁶
 - 4 - Elective
- 14

Second Semester

- 3 - Major Requirement⁴
 - 6 - Minor Requirement⁶
 - 6 - Elective
- 15

120 Total Semester Hours

¹Two semesters (through 202) in the same modern foreign language are required.

²See General Education Requirements. (Note: Two Cross-Cultural Awareness and two Mathematics courses are required.)

³See General Education Requirements. Social Science Requirement must be in an area other than psychology.

⁴See major requirements in program description above.

⁵See General Education Requirements. A two-semester sequence in the same physical or biological science, each including a laboratory, is required.

⁶Select any minor listed on page 86.

PSYCHOLOGY

Bachelor of Science

The Bachelor of Science program in Psychology requires PSYCH 201, 202, 309, 310, 492, and 19 additional credits selected from PSYCH 275 and/or 300-400-level psychology courses arranged as follows:

Two courses from the **Biological and Cognitive** menu: PSYCH 324, 333, 422

One course from each of the following menus:

Applied—PSYCH 275, 355, 364, 368, 375, 383, 435, 456, 480, 488

Foundations of Science—G W 402, PHIL 326, 327, 425, PSYCH 415

Individuals and Groups—PSYCH 340, 352, 370

Laboratory—PSYCH 325, 334, 423, 456, 471, H490, 493, 495, 496, 497, 498

At least six credits must be from 400-level psychology courses, with at least three of those credits from psychology courses numbered between 400 and 489. BIOSC 470 may be taken in lieu of one elective psychology course. Students satisfying both the Applied and Laboratory requirements with PSYCH 456 must still satisfy the requirement for 19 additional credits in Psychology (see above). Students should consult their advisors for other degree requirements and course recommendations.

Freshman Year

First Semester

- 3 - BIOL 103 General Biology I¹
- 1 - BIOL 105 General Biology Lab. I¹
- 3 - PHIL 102 Introduction to Logic
- 3 - PSYCH 201 Introduction to Psychology
- 1 - PSYCH 202 Introductory Psychology Lab.
- 3 - Mathematics Requirement²

14

Second Semester

- 3 - BIOL 104 General Biology II¹
- 1 - BIOL 106 General Biology Lab. II¹
- 3 - ENGL 103 Accelerated Composition
- 3 - Major Requirement¹
- 3 - Mathematics Requirement²
- 3 - Elective

16

Sophomore Year

First Semester

- 4 - PSYCH 309 Introductory Experimental Psych.
- 3 - Arts and Humanities (Literature) Requirement²
- 3 - Mathematics Requirement²
- 3 - Natural Science Requirement⁴
- 1 - Elective

14

Second Semester

- 4 - PSYCH 310 Advanced Experimental Psych.
- 3 - Cross-Cultural Awareness Requirement²
- 3 - Natural Science Requirement⁴
- 3 - Social Science Requirement⁵
- 3 - Elective

16

Junior Year

First Semester

- 4 - Major Requirement¹
- 3 - Minor Requirement⁶
- 3 - Science Requirement⁷
- 6 - Elective

16

Second Semester

- 3 - COMM 150 Intro. to Human Comm. or
3 - COMM 250 Public Speaking
- 3 - Major Requirement¹
- 3 - Minor Requirement⁶
- 3 - Social Science Requirement⁵
- 3 - Elective

15

Senior Year

First Semester

- 1 - PSYCH 492 Senior Laboratory in Psychology
- 6 - Major Requirement¹
- 3 - Minor Requirement⁶
- 3 - Science and Tech. in Society Requirement²
- 1 - Elective

14

Second Semester

- 3 - Major Requirement¹
- 6 - Minor Requirement⁶
- 6 - Elective

15

120 Total Semester Hours

¹Biology 110 and 111 may be substituted. In this case, the extra two credit hours will count toward the Science Requirement.

²See General Education Requirements. (Note: Three courses in mathematics are required.)

³See major requirements in program description above.

⁴See General Education Requirements. A two-semester sequence in the same natural science other than biology is required.

⁵See General Education Requirements. PSYCH 201 and two additional non-psychology social science courses (from the same or different fields) satisfy General Education and departmental requirements.

⁶Select any minor listed on page 86.

⁷Three credit hours, in addition to the Natural Science Requirement, in any natural or physical science are required.

SOCIOLOGY

The Sociology major offers two degree programs: a Bachelor of Arts and a Bachelor of Science. Both degrees prepare students for a variety of professional careers related to human resources, management, public relations, social services, criminal justice, health services, social research, and other people-oriented positions in the public and private sector. In addition, the Bachelor's degree provides excellent preparation for graduate training in sociology, anthropology, social services, law, and business. Both degrees require a total of 121 semester hours, including 36 credit hours in sociology and/or anthropology, as identified below. Courses used to fulfill General Education Requirements may be used to fulfill minor requirements.

Change of Major into Sociology

Students who change majors into Sociology must have completed at least 12 credit hours at Clemson or in the Bridge Program and must have a 2.0 minimum Clemson/Bridge cumulative grade-point ratio.

Emphasis Areas in Sociology

Community Studies—R S (SOC) 459, SOC 331, (R S) 495; and nine credits from all courses offered in anthropology or sociology not already taken to fulfill requirements.

Criminal Justice—SOC 388, 389; nine credits selected from SOC 391, 392, 396, 397, 491, 493, 494, (R S) 495; and three credits from all courses offered in anthropology or sociology not already taken to fulfill requirements.

General Sociology—18 credit hours selected from any courses in anthropology or sociology not already taken to fulfill requirements.

Social Services—SOC 380, 414, (R S) 495; and nine credits from all courses offered in anthropology or sociology not already taken to fulfill requirements.

At least 12 of the total credits must be from 400-level sociology, rural sociology, and/or anthropology courses; no more than nine credit hours may be taken in courses at the 100 or 200 level, except with approval of the department chair. Additional electives are added to meet the minimum of 121 hours required for graduation.

Substance Abuse Certificate Program

The Substance Abuse Certificate Program is an interdisciplinary program drawn from courses in sociology, education, health, and psychology. Students study the causes, consequences, prevention, and treatment of substance abuse. They also study delivery systems and policy issues associated with legal and illicit substances. Through field placement, students come face to face with the problem and gain practical experience to prepare them to enter the field of practicing specialists. The credential requires knowledge in theory and treatment of substance abuse problems.

Completion of the Substance Abuse Certificate Program requires ED C 234, PSYCH 375, SOC 380, 396, 397, (R S) 495, plus a related course approved by the certificate program director.

Bachelor of Arts

Freshman Year

First Semester

- 3 - MTHSC 101 Essential Math. for Informed Soc.
- 3 - SOC 201 Introduction to Sociology
- 3 - Foreign Language Requirement¹
- 4 - Natural Science Requirement²
- 3 - Elective

16

Second Semester

- 3 - ENGL 103 Accelerated Composition
- 3 - MTHSC 203 Elementary Statistical Inference
- 3 - Foreign Language Requirement¹
- 3 - Social Science Requirement²
- 3 - Elective

15

Sophomore Year**First Semester**

- 3 - COMM 150 Intro. to Human Comm. *or*
 - 3 - COMM 250 Public Speaking
 - 3 - Arts and Humanities (Literature) Requirement²
 - 3 - Cross-Cultural Awareness Requirement²
 - 6 - Elective
- 15

Second Semester

- 1 - SOC 205 Sociology Lab.
 - 3 - Arts and Humanities (Non-Lit.) Requirement²
 - 6 - Minor Requirement¹
 - 3 - Science and Tech. in Society Requirement²
 - 3 - Elective
- 16

Junior Year**First Semester**

- 3 - ANTH 301 Cultural Anthropology *or*
 - 3 - SOC 433 Globalization and Social Change
 - 4 - SOC (R S) 303 Methods of Social Research I
 - 3 - Advanced Humanities Requirement⁴
 - 3 - Advanced Writing Requirement⁵
 - 3 - Emphasis Area Requirement⁶
- 16

Second Semester

- 3 - Advanced Humanities Requirement⁴
 - 6 - Emphasis Area Requirement⁶
 - 6 - Minor Requirement¹
- 15

Senior Year**First Semester**

- 3 - SOC 460 Race, Ethnicity, and Class *or*
 - 3 - SOC 461 Sex Roles
 - 3 - Advanced Humanities Requirement⁴
 - 6 - Emphasis Area Requirement⁶
 - 3 - Elective
- 15

Second Semester

- 3 - SOC 404 Sociological Theory
 - 1 - SOC 497 Sociology Senior Lab.
 - 3 - Advanced Humanities Requirement⁴
 - 3 - Emphasis Area Requirement⁶
 - 3 - Minor Requirement¹
- 13

121 Total Semester Hours

¹Two semesters (through 202) in the same modern foreign language are required.

²See General Education Requirements. (Note: Social Science Requirement must be in an area other than anthropology or sociology.)

³See page 86 for approved minors.

⁴Humanities courses numbered 300 or higher (A A H 210, MUSIC 210, THEA 210 excepted). The humanities for this purpose include art and architectural history, communication studies (except 364 and 368), English (except 304, 312, 314, 316, 333, 334, 335, 485, 490, 495), languages, music, philosophy, religion, theatre (except 377, 487, 497), and women's studies, as well as courses entitled Humanities.

⁵ENGL 304, 312, 314, or 316

⁶See emphasis area requirements in program description above.

SOCIOLOGY**Bachelor of Science****Freshman Year****First Semester**

- 3 - MTHSC 101 Essential Math. for Informed Soc.
 - 3 - SOC 201 Introduction to Sociology
 - 4 - Natural Science Requirement¹
 - 3 - Social Science Requirement¹
 - 3 - Elective
- 16

Second Semester

- 3 - COMM 150 Intro. to Human Comm. *or*
 - 3 - COMM 250 Public Speaking
 - 3 - ENGL 103 Accelerated Composition
 - 3 - MTHSC 203 Elementary Statistical Inference
 - 3 - Departmental Math or Science Requirement²
 - 3 - Elective
- 15

Sophomore Year**First Semester**

- 3 - Arts and Humanities (Literature) Requirement¹
 - 3 - Cross-Cultural Awareness Requirement¹
 - 3 - Departmental Math or Science Requirement²
 - 3 - Minor Requirement¹
 - 3 - Elective
- 15

Second Semester

- 1 - SOC 205 Sociology Lab.
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
 - 3 - Departmental Math or Science Requirement²
 - 6 - Minor Requirement¹
 - 3 - Science and Tech. in Society Requirement¹
- 16

Junior Year**First Semester**

- 3 - ANTH 301 Cultural Anthropology *or*
 - 3 - SOC 433 Globalization and Social Change
 - 4 - SOC (R S) 303 Methods of Social Research I
 - 3 - Advanced Writing Requirement⁴
 - 3 - Emphasis Area Requirement⁵
 - 3 - Philosophy Requirement⁶
- 16

Second Semester

- 3 - Advanced Humanities Requirement⁷
 - 3 - Departmental Math or Science Requirement²
 - 6 - Emphasis Area Requirement⁵
 - 3 - Minor Requirement¹
- 15

Senior Year**First Semester**

- 3 - SOC 460 Race, Ethnicity, and Class *or*
 - 3 - SOC 461 Sex Roles
 - 6 - Departmental Math or Science Requirement²
 - 3 - Emphasis Area Requirement⁵
 - 3 - Elective
- 15

Second Semester

- 3 - SOC 404 Sociological Theory
 - 1 - SOC 497 Sociology Senior Lab.
 - 6 - Emphasis Area Requirement¹
 - 3 - Minor Requirement¹
- 13

121 Total Semester Hours

¹See General Education Requirements. (Note: Social Science Requirement must be in an area other than anthropology or sociology.)

²See advisor. At least nine of the 18 hours must be at the 300 level or above.

³See page 86 for approved minors.

⁴ENGL 304, 312, 314, or 316

⁵See emphasis area requirements in program description above.

⁶PHIL 323, 325, 326, 327, 355, or 360

⁷Humanities courses numbered 300 or higher (A A H 210, MUSIC 210, THEA 210 excepted). The humanities for this purpose include art and architectural history, communication studies (except 364 and 368), English (except 304, 312, 314, 316, 333, 334, 335, 485, 490, 495), languages, music, philosophy, religion, theatre (except 377, 487, 497), and women's studies, as well as courses entitled Humanities.

MINORS

Following are minors acceptable for students in the College of Business and Behavioral Science. Students cannot major and minor in the same field or acquire a minor that is not allowed by the degree program.

Accounting	Management Information Systems— <i>not open to Management Majors</i>
Adult/Extension Education	Mathematical Sciences
Aerospace Studies	Microbiology
Agricultural Business Management	Military Leadership
Agricultural Mechanization and Business	Modern Languages
American Sign Language Studies	Music
Animal and Veterinary Sciences	Natural Resource Economics
Anthropology	Nonprofit Leadership
Architecture	Packaging Science
Athletic Leadership	Pan African Studies
Biochemistry	Park and Protected Area Management
Biological Sciences	Philosophy
Business Administration— <i>not open to Accounting, BS Economics, Financial Management, Management, or Marketing majors</i>	Physics
Chemistry	Plant Pathology
Cluster	Political Science
Communication Studies	Psychology
Computer Science	Public Policy— <i>not open to Political Science majors</i>
Crop and Soil Environmental Science	Religion
East Asian Studies	Russian Area Studies
Economics	Science and Technology in Society
Education— <i>not open to Graphic Communications majors</i>	Screenwriting
English	Sociology
Entomology	Spanish-American Area Studies
Entrepreneurship— <i>not open to Accounting, BS Economics, Financial Management, Management, or Marketing majors</i>	Theatre
Environmental Engineering	Therapeutic Recreation
Environmental Science and Policy	Travel and Tourism
Equine Business	Turfgrass
Film Studies	Urban Forestry
Financial Management	Wildlife and Fisheries Biology
Food Science	Women's Studies
Forest Products	Writing
Forest Resource Management	
Genetics	
Geography	
Geology	
Global Politics— <i>not open to Political Science majors</i>	
Great Works	
History	
Horticulture	
International Engineering and Science	
Legal Studies	
Management	

See pages 36–39 for details.

COLLEGE OF ENGINEERING AND SCIENCE

The College of Engineering and Science offers a broad range of rigorous and stimulating baccalaureate programs that provide unexcelled educational opportunities. The innovative combination of engineering and science disciplines that comprises the College, facilitates study and research in fields transcending the traditional disciplines. Students enjoy close interaction with a distinguished faculty committed to excellence in undergraduate education, as well as in research. Additional information on the College and its programs is available at www.clemson.edu/ces.

Minors

Engineering and science students can complement their majors by selecting minor concentrations of study. Available minors include Environmental Engineering, International Engineering and Science, and one in each of the science majors (see page 106).

International Programs

The world economy has become very tightly integrated, making it highly important that engineering and science students prepare themselves for this global environment. The College offers a minor in International Engineering and Science coupled with several programs that provide opportunities for students to gain international experience. These include study abroad at many locations around the world and EPIC (an international co-op program). In addition, engineering and science students are encouraged to pursue study of a foreign language. Information is available in the Undergraduate Studies Office (107 Riggs Hall) and at www.clemson.edu/ces/students/global.

ENGINEERING PROGRAMS

The Bachelor of Science engineering degree programs in Biosystems Engineering, Ceramic and Materials Engineering, Chemical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Industrial Engineering, and Mechanical Engineering are each accredited by the Engineering Accreditation Commission (EAC) of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012; telephone: (410) 347-7700. The Biosystems Engineering program is administered jointly with the College of Agriculture, Forestry and Life Sciences. The new BS degree programs in Bioengineering and Environmental Engineering are designed to meet ABET requirements and will be submitted to ABET for accreditation review when eligible.

All engineering programs have the common goal of producing engineering graduates who are able to

- apply knowledge of math, science, and engineering
- identify, formulate, and solve engineering problems
- design and conduct experiments and analyze data

- design systems or components to meet needs within realistic constraints
- function on multidisciplinary teams
- communicate effectively
- conduct themselves professionally and ethically
- understand engineering's global, economic, environmental, and societal context
- understand contemporary engineering issues
- apply modern engineering methods and tools
- appreciate the need for life-long learning

Each engineering program has objectives specific to the discipline. All prepare students for a wide range of career opportunities and provide sound preparation for graduate study. Each curriculum provides opportunities for students to pursue individual areas of interest.

Admission Requirements

The University admission requirements are given under the section entitled *Admission*. Engineering applicants are strongly advised to include the following in their high school programs:

Mathematics—Four units, including geometry, trigonometry, and introductory calculus

Laboratory Science—At least three units, including both chemistry and physics

Computing—At least one unit, including introduction to a programming language. Applicants should have good keyboarding skills.

General Engineering Program

All new engineering students (including transfer students who have not completed all courses in the freshman engineering curriculum) are admitted into General Engineering. The General Engineering Program provides students an opportunity to explore various engineering fields while getting a sound academic preparation for engineering study.

Freshman Curriculum

First Semester

- 2 - CES 102 Engineering Disciplines and Skills
- 4 - CH 101 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - General Education Requirement¹

16

Second Semester

- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I
- 2-3 - Departmental Freshman Engineering Req.²
- 3-4 - Departmental Science Requirement²
- 3 - General Education Requirement¹

15-17

¹See Policy on General Education Requirements for Engineering Curricula below.

²See advisor.

Admission into Engineering Degree Programs

To transfer into an engineering degree program, a student must have completed the following courses in the freshman engineering curriculum with a grade of C or better:

- 2 - CES 102 Engineering Disciplines and Skills
- 4 - CH 101 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 106 Calculus of One Variable I
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I
- 2-3 - Departmental Freshman Engineering Req.

In addition, the student must have the minimum grade-point ratio specified by the engineering degree program for admission.

Students should initiate a change-of-major request prior to the registration period during the semester when they expect to complete the freshman curriculum. Students who fail to meet the requirements for admission into a degree program may remain in General Engineering until those requirements are met; however, General Engineering majors are not permitted to take 300- or 400-level engineering courses. Engineering departments may allow General Engineering majors to enroll in selected 200-level engineering courses (policy varies by department). Students admitted into an engineering degree program will follow the curriculum in effect at the time of admission into General Engineering, unless otherwise approved by the specific engineering department.

General Education Requirements for Engineering Curricula

Engineers have an obligation to practice their profession in a socially responsible manner. The education of engineers must prepare them for this responsibility and make them aware of the constraints imposed by societal and cultural factors. Thus, the humanities and social sciences are an important component of the engineering curricula. Further, the program of study must include educational experiences addressing the intersection of science and technology with society and cross-cultural awareness.

In addition to the University General Education Requirements, some engineering majors are required to complete additional credit hours from a college approved list. Individual engineering curricula may have more specific requirements. For a complete list of acceptable courses, please speak with an advisor.

Electives for Engineering Curricula

Advisors must approve any course taken for elective credit in the Engineering curricula. Courses excluded for elective credit include PHYS 200, 207/209, 208/210.

Registration Requirements

A cumulative grade-point ratio of 2.0 or higher is required for registration in engineering courses numbered 300 or higher. Priority for registration in engineering courses is given to those majors for whom the course is a degree requirement. Exceptions to this requirement may be granted by the department offering the course.

Graduation Requirements

In addition to other institutional requirements, candidates for a baccalaureate degree in Engineering are required to have a 2.0 or higher cumulative grade-point ratio in all engineering courses taken at Clemson. All courses with "Engineering" in the course designator (e.g., ENGR 130, M E 453, etc.) are used in this calculation.

The baccalaureate programs in Engineering are designed to be completed in four years (eight regular semesters). Taking a reduced load or participating in cooperative education will extend this time. On average, Clemson engineering students take about four and one-half years to complete the requirements for graduation.

BIOENGINEERING

Bachelor of Science

The undergraduate program in Bioengineering is built upon a rigorous engineering science foundation that is, in turn, based upon a broad curriculum of applied and life sciences, mathematics, electives in humanities, social science, and design. Students select a formal focus that concentrates in a subfield of interest in bioengineering: Biomaterials Concentration or Bioelectrical Concentration.

The curriculum provides undergraduates with a solid background in engineering and life sciences in preparation for advanced studies. Through the Bioengineering program, graduates acquire an understanding of biology, biochemistry, and physiology and the capability to apply advanced mathematics, including differential equations and statistics, science, and engineering, to solve the problems at the interface of engineering and biology. Graduates also have an ability to make measurements on and interpret data from living systems, addressing the problems associated with the interaction between living and nonliving materials and systems.

Combined Bachelor's/Master's Plan

Bioengineering undergraduates may begin a Master of Science degree program while completing the Bachelor of Science degree and use a limited number of courses to satisfy the requirements of both the undergraduate and graduate degrees. Details are available from the Department of Bioengineering.

BIOELECTRICAL CONCENTRATION

Freshman Year

First Semester

- 2 - CES 102 Engineering Disciplines and Skills
- 4 - CH 101 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹

16

Second Semester

- 4 - CH 102 General Chemistry
- 3 - ENGR 141 Programming and Problem Solving
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I²
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹
- 1 - Biology Requirement³

18

Sophomore Year

First Semester

- 3 - BIO E 201 Intro. to Biomedical Engineering
- 2 - E C E 201 Logic and Computing Devices
- 3 - E C E 202 Electric Circuits I
- 1 - E C E 209 Logic and Computing Devices Lab.
- 1 - E C E 211 Electrical Engineering Lab. I
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II²

17

Second Semester

- 3 - C M E 210 Introduction to Materials Science
- 3 - C E 201 Statics
- 1 - E C E 212 Electrical Engineering Lab. II
- 3 - E C E 262 Electric Circuits II
- 4 - MTHSC 208 Intro. to Ordinary Diff. Equations

14

Junior Year

First Semester

- 4 - CH 201 Survey of Organic Chemistry²
- 1 - E C E 311 Electrical Engineering Lab. III
- 3 - E C E 320 Electronics I
- 3 - E C E 330 Signals, Systems, and Transforms
- 3 - E C E 380 Electromagnetics
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹

17

Second Semester

- 3 - BIO E 302 Biomaterials
- 3 - BIO E 370 Bioinstrumentation and Bioimaging
- 3 - BIOCH 305 Essential Elements of Biochem.
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹
- 3 - Bioengineering or E C E Technical Requirement³

15

Senior Year

First Semester

- 3 - BIO E 320 Biomechanics
- 3 - BIO E 401 Bioengineering Design Theory
- 4 - BIOSC 315 Functional Human Anatomy
- 3 - BIOSC 461 Cell Biology
- 2 - BIOSC 462 Cell Biology Lab.

15

Second Semester

- 1 - BIO E 400 Senior Seminar
- 3 - BIO E 403 Applied Biomedical Design
- 3 - BIO E 448 Tissue Engineering
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹
- 6 - Bioengineering or E C E Technical Requirement³

16

128 Total Semester Hours

¹See Policy on Humanities and Social Sciences for Engineering Curricula. Six of these credit hours must also satisfy General Education Cross-Cultural Awareness and Science and Technology in Society Requirements.

²Students planning to enter medical school should take CH 223/227 instead of CH 201 and take CH 224/228 as an additional course sequence. Students planning to enter medical school should also take physics laboratories as additional courses (PHYS 124 and PHYS 223).

³Select from department-approved list.

Notes:

1. To transfer from General Engineering into the Bioengineering degree program, students must have a minimum cumulative grade-point ratio of 3.0 in courses taken at Clemson and must have earned a C or better in each course in the General Engineering freshman curriculum, including the Arts and Humanities/Social Science Requirements.
2. A student is allowed to enroll in E C E courses (excluding E C E 307, 308, 309) only when all prerequisites have been passed with a grade of C or better.
3. All Bioelectrical Concentration students must have a cumulative engineering grade-point ratio of 2.0 to enroll in any 300- or 400-level E C E courses.
4. No student may exceed a maximum of two attempts, excluding a W, to complete successfully any E C E course.

BIOMATERIALS CONCENTRATION

Freshman Year

First Semester

- 2 - CES 102 Engineering Disciplines and Skills
- 4 - CH 101 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹

16

Second Semester

- 4 - CH 102 General Chemistry
- 3 - ENGR 141 Programming and Problem Solving
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I²
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹
- 1 - Biology Requirement³

18

Sophomore Year

First Semester

- 3 - BIO E 201 Intro. to Biomedical Engineering
- 3 - C M E 210 Introduction to Materials Science
- 4 - CH 201 Survey of Organic Chemistry²
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II²

17

Second Semester

- 3 - BIO E 302 Biomaterials
- 3 - C E 201 Statics
- 2 - E C E 307 Basic Electrical Engineering
- 1 - E C E 309 Electrical Engineering Lab. I
- 2 - E G 208 Engr. Graphics and Machine Design
- 4 - MTHSC 208 Intro. to Ordinary Diff. Equations

15

Junior Year**First Semester**

- 3 - BIO E 320 Biomechanics
- 4 - BIOSC 315 Functional Human Anatomy
- 3 - C M E 319 Materials Processing I
- 3 - C M E 326 Thermodynamics of Materials
- 3 - C M E 327 Transport Phenomena

16**Second Semester**

- 3 - BIOCH 305 Essential Elements of Biochem.
- 3 - BIO E 321 Biofluid Mechanics
- 3 - MTHSC 302 Statistics for Science and Engr.
- 3 - Bioengineering Technical Requirement³
- 3 - Arts and Humanities Requirement¹ or
- 3 - Social Science Requirement¹

15**Senior Year****First Semester**

- 3 - BIO E 370 Bioinstrumentation and Bioimaging
- 3 - BIO E 401 Bioengineering Design Theory
- 3 - BIOSC 461 Cell Biology
- 3 - PFC 415 Intro. to Polymer Science and Engr.
- 3 - Bioengineering Technical Requirement³

15**Second Semester**

- 1 - BIO E 400 Senior Seminar
- 3 - BIO E 403 Applied Biomedical Design
- 3 - BIO E 448 Tissue Engineering
- 6 - Arts and Humanities Requirement¹ or
- 6 - Social Science Requirement¹
- 3 - Bioengineering Technical Requirement³

16

128 Total Semester Hours

¹See Policy on Humanities and Social Sciences for Engineering Curricula. Six of these credit hours must also satisfy General Education Cross-Cultural Awareness and Science and Technology in Society Requirements.

²Students planning to enter medical school should take CH 223/227 instead of CH 201 and take CH 224/228 as an additional course sequence. Students planning to enter medical school should also take physics laboratories as additional courses (PHYS 124 and PHYS 223).

³Select from department-approved list.

Note: To transfer from General Engineering into the Bioengineering degree program, students must have a minimum cumulative grade-point ratio of 3.0 in courses taken at Clemson and must have earned a C or better in each course in the General Engineering freshman curriculum including the Arts and Humanities/Social Science Requirements.

BIOSYSTEMS ENGINEERING**Bachelor of Science**

Biosystems engineering is a science-based engineering discipline that integrates engineering science and design with applied biological, biochemical and environmental sciences. Biosystems engineers use engineering analysis and design to solve problems involving microorganisms, animals, humans and ecosystems. The biosystems engineering degree program is unique among engineering disciplines because it incorporates bioprocess, structural and mechanical design.

The B.S. in Biosystems Engineering is nationally accredited by ABET, the Accreditation Board for Engineering and Technology. Students who receive the Bachelor of Science degree are eligible for licensing as professional engineers after gaining acceptable experience and passing the Fundamentals of Engineering and the Principles and Practice of Engineering examinations.

Undergraduate students in Biosystems Engineering may participate in exciting research opportunities in the areas of water quality, bioprocessing, non-point source pollution, instrumentation and control, and biofuels production.

Graduates in biosystems engineering are well equipped to use their expertise in engineering in many areas that affect our quality of life and environment. They have broad training in mathematics, physics, chemistry and biological sciences, as well as a sound background in the engineering sciences. Biosystems engineers are sought by industry and public service organizations primarily for their ability to apply engineering expertise to living systems and to the management of land and water resources.

For further information, visit <http://www.clemson.edu/cafls/departments/biosystemseng/beng/>

Combined Bachelor's/Master's Program

Under this plan, students may reduce the time necessary to earn both degrees by applying graduate credits to both undergraduate and graduate program requirements.

Undergraduate students in Biosystems Engineering may begin a Master of Science or a Master of Engineering Degree in Environmental Engineering and Science while completing the BS degree. Students in the Applied Biotechnology Concentration may apply graduate credits toward a Master of Science Degree in Bioengineering.

Students are encouraged to obtain the specific requirements for the dual degree from the academic departments involved as early as possible in their undergraduate program. See *Academic Regulations* in this catalog for enrollment guidelines and procedures.

APPLIED BIOTECHNOLOGY CONCENTRATION**Freshman Year****First Semester**

- 2 - CES 102 Engineering Disciplines and Skills
- 4 - CH 101 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - Arts and Humanities Requirement¹ or
- 3 - Social Science Requirement¹

16**Second Semester**

- 4 - CH 102 General Chemistry
- 2 - ENGR 130 Engineering Fundamentals
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I
- 3 - Arts and Humanities Requirement¹ or
- 3 - Social Science Requirement¹

16**Sophomore Year****First Semester**

- 2 - B E 210 Intro. to Biosystems Engineering
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II
- 4 - Biology Requirement²
- 3 - Statics Requirement²

16**Second Semester**

- 2 - B E 212 Fundamentals of Biosystems Engr.
- 2 - E G 209 Intro. to Engr./Computer Graphics
- 3 - M E 310 Thermodynamics and Heat Transfer or
- 3 - CH E 220 Chem. Engr. Thermodynamics I
- 4 - MICRO 305 General Microbiology
- 4 - MTHSC 208 Intro. to Ordinary Diff. Equations
- 2 - Dynamics Requirement²

17**Junior Year****First Semester**

- 3 - B E 312 Biol. Kinetics and Reactor Modeling
- 4 - C E 341 Introduction to Fluid Mechanics or
- 4 - CH E 230 Fluids/Heat Transfer
- 2 - E C E 307 Basic Electrical Engineering
- 3 - Mechanics of Materials Requirement²
- 4 - Organic Chemistry Requirement¹

16**Second Semester**

- 3 - B E 314 Biosystems Engr. Mechanical Design or
- 3 - M E 306 Fundamentals of Machine Design
- 3 - B E 412 Heat and Mass Transport in B E
- 4 - B E 415 Instrumentation and Control for Biosystems Engineers
- 3 - B E (CH E) 428 Biochemical Engineering
- 4 - Biochemistry Requirement⁴

17**Senior Year****First Semester**

- 3 - B E 414 Biosystems Engr. Unit Operations
- 3 - B E 438 Bioprocess Engineering Design
- 2 - B E 474 Biosystems Engr. Design/Project Mgt.
- 6 - Arts and Humanities Requirement¹ or
- 6 - Social Science Requirement¹
- 3 - Life Science Requirement⁵

17

Second Semester

- 3 - B E 435 Appl. in Biotechnology Engineering
 2 - B E 475 Biosystems Engr. Capstone Design
 3 - Arts and Humanities Requirement¹ or
 3 - Social Science Requirement¹
 3 - Engineering Requirement²
2 - Elective
13

128 Total Semester Hours

¹See Policy on Humanities and Social Sciences for Engineering Curricula. Six of these credit hours must also satisfy General Education Cross-Cultural Awareness and Science and Technology in Society Requirements.

²See advisor. Select from department-approved list.

¹CH 223 and 227 (preferred) or CH 201

⁴BIOCH 301/302 or 305/306

⁵MICRO 413 or any approved 300-400-level course in BIOCH, BIOSC, GEN, or MICRO

Notes:

1. Biosystems Engineering students are allowed to enroll in upper-level B E courses only when the following prerequisites have been completed with C or better: C E 206, 208, 341, CH E 220, 230, E M 201, 202, M E 201, 302, 310, MTHSC 206, 208, PHYS 221.
2. Students accepted to a combined BS/MS program must take 600-level instead of 400-level courses for Life Science and Engineering Requirements.
3. To complete premedicine requirements, students must take BIOL 104/106 or III, CH 224, 228, and PHYS 124, 223 as additional courses.

NATURAL RESOURCES AND ENVIRONMENT CONCENTRATION

Freshman Year**First Semester**

- 2 - CES 102 Engineering Disciplines and Skills
 4 - CH 101 General Chemistry
 3 - ENGL 103 Accelerated Composition
 4 - MTHSC 106 Calculus of One Variable I
 3 - Arts and Humanities Requirement¹ or
 3 - Social Science Requirement¹
16

Second Semester

- 4 - CH 102 General Chemistry
 2 - ENGR 130 Engineering Fundamentals
 4 - MTHSC 108 Calculus of One Variable II
 3 - PHYS 122 Physics with Calculus I
 3 - Arts and Humanities Requirement¹ or
 3 - Social Science Requirement¹
16

Sophomore Year**First Semester**

- 2 - B E 210 Intro. to Biosystems Engineering
 2 - B E 222 Geomeasurements
 4 - MTHSC 206 Calculus of Several Variables
 3 - PHYS 221 Physics with Calculus II
 4 - Biology Requirement²
 3 - Statics Requirement²
18

Second Semester

- 2 - B E 212 Fundamentals of Biosystems Engr.
 2 - E G 209 Intro. to Engr./Comp. Graphics
 3 - M E 310 Thermodynamics and Heat Transfer
 4 - MICRO 305 General Microbiology
 4 - MTHSC 208 Intro. to Ordinary Diff. Equations
 2 - Dynamics Requirement²
17

Junior Year**First Semester**

- 3 - B E 312 Biol. Kinetics and Reactor Modeling
 4 - C E 321 Geotechnical Engineering or
 4 - CSENV 202 Soils
 4 - C E 341 Introduction to Fluid Mechanics
 2 - E C E 307 Basic Electrical Engineering
 3 - Mechanics of Materials Requirement²
16

Second Semester

- 3 - B E 314 Biosystems Engr. Mechanical Design or
 3 - M E 306 Fundamentals of Machine Design
 3 - B E 322 Small Watershed Hydrology and
 Sedimentology
 3 - B E 412 Heat and Mass Transport in B E
 4 - B E 415 Instrumentation and Control for B E
 3 - Structural Design Requirement²
16

Senior Year**First Semester**

- 3 - B E 414 Biosystems Engr. Unit Operations
 3 - B E 464 Non-Point Source Management in
 Engineered Ecosystems
 2 - B E 474 Biosystems Engr. Design/Project Mgt.
 6 - Arts and Humanities Requirement¹ or
 6 - Social Science Requirement¹
 3 - Engineering Requirement²
17

Second Semester

- 2 - B E 421 Engineering Syst. for Soil Water Mgt.
 2 - B E 475 Biosystems Engr. Capstone Design
 3 - Arts and Humanities Requirement¹ or
 3 - Social Science Requirement¹
 3 - Engineering Requirement²
2 - Elective
12

128 Total Semester Hours

¹See Policy on Humanities and Social Sciences for Engineering Curricula. Six of these credit hours must also satisfy General Education Cross-Cultural Awareness and Science and Technology in Society Requirements.

²See advisor. Select from department-approved list.

Notes:

1. Biosystems Engineering students are allowed to enroll in upper-level B E courses only when the following prerequisites have been completed with C or better: C E 206, 208, 341, CH E 220, 230, E M 201, 202, M E 201, 302, 310, MTHSC 206, 208, PHYS 221.
2. Students accepted to a combined BS/MS program must take 600-level instead of 400-level courses for Engineering Requirements.

CERAMIC AND MATERIALS ENGINEERING

Bachelor of Science

The School of Materials Science and Engineering offers undergraduate degrees in Ceramic and Materials Engineering, and Polymer and Fiber Chemistry.

Ceramic and materials engineers design, develop, and participate in the manufacture of both standard and new materials intended for use in a wide variety of industries with diverse applications. These range from the traditional materials industries, such as structural clay, foundry, or whiteware industries to the newer industries, such as the semiconductor or aerospace industries. The broad career responsibilities of this discipline require competence in science, engineering, mathematics, and the social sciences. The curriculum develops skills in problem solving, engineering analysis, and design as well as oral and written communication.

The baccalaureate program integrates laboratory with classroom experiences to prepare students for life-long learning. Courses covering thermodynamics, kinetics, mechanical behavior, processing, and characterization of materials prepare students for careers in industry and/or for graduate school.

In addition to the common educational objectives of all engineering programs, baccalaureate degree graduates in Ceramic and Materials Engineering will be able to

- demonstrate learning consistent with Accreditation Board for Engineering and Technology Engineering Criteria 2000 for ceramic and materials engineering programs
- function easily and well in the laboratory and plant environments and
- serve the local, national, and international ceramic and materials communities

Specifically, the Accreditation Board for Engineering and Technology Engineering Criteria 2000 requires that baccalaureate degree graduates in Ceramic and Materials Engineering be able to

- apply advanced scientific and engineering principles to materials systems
- demonstrate an integrated understanding of the scientific and engineering principles underlying structure, properties, processing, and performance relationships
- apply this understanding to the solution of ceramic and materials engineering selection and design problems and
- apply appropriate experimental, statistical, and computational methods to advantage in the solution of ceramic and materials problems

Freshman Year**First Semester**

- 2 - CES 102 Engineering Disciplines and Skills
 4 - CH 101 General Chemistry
 3 - ENGL 103 Accelerated Composition
 4 - MTHSC 106 Calculus of One Variable I
 3 - Arts and Humanities Requirement¹ or
 3 - Social Science Requirement¹
16

Second Semester

- 4 - CH 102 General Chemistry
- 2 - ENGR 130 Engineering Fundamentals
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I
- 3 - Arts and Humanities Requirement¹ or
- 3 - Social Science Requirement¹

16

Sophomore Year**First Semester**

- 3 - C M E 210 Introduction to Materials Science
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II
- 6 - Arts and Humanities Requirement¹ or
- 6 - Social Science Requirement¹

16

Second Semester

- 1 - C M E 241 Metrics Lab.
- 3 - C E 201 Statics
- 2 - E G 209 Intro. to Engr./Computer Graphics
- 3 - MS&E 324 Statistics for Materials Science and Engineering
- 4 - MTHSC 208 Intro. to Ordinary Diff. Equations
- 3 - Arts and Humanities Requirement¹ or
- 3 - Social Science Requirement¹

16

Junior Year**First Semester**

- 3 - C M E 319 Materials Processing I
- 3 - C M E 326 Thermodynamics of Materials
- 3 - C M E 327 Transport Phenomena
- 3 - COMM 250 Public Speaking
- 3 - Technical Writing Requirement²

15

Second Semester

- 3 - C M E 328 Phase Diagrams for Materials Processing and Applications
- 2 - C M E 342 Structure/Property Lab.
- 3 - C M E 361 Process. of Metals and Composites
- 3 - C M E 422 Mechanical Behavior of Materials
- 3 - I E 384 Engineering Economic Analysis
- 3 - PFC 303 Textile Chemistry

17

Senior Year**First Semester**

- 3 - C M E 402 Solid State Materials
- 3 - C M E 413 Noncrystalline Materials
- 3 - C M E 432 Manufacturing Processes and Syst.
- 1 - C M E 441 Manufacturing Lab.
- 3 - PFC 415 Intro. to Polymer Science and Engr.
- 3 - Research Requirement²

16

Second Semester

- 3 - C M E 407 Senior Capstone Design
- 3 - C M E 416 Electronic Properties of Materials
- 3 - C M E 424 Optical Materials and Applications
- 3 - C M E 433 Combustion Systems and Environmental Emissions
- 1 - C M E 445 Practice of Materials Engineering

13

125 Total Semester Hours

¹See Policy on Humanities and Social Sciences for Engineering Curricula. Six of these credit hours must also satisfy General Education Cross-Cultural Awareness and Science and Technology in Society Requirements.

²See advisor.

CHEMICAL ENGINEERING**Bachelor of Science**

The Department of Chemical and Biomolecular Engineering offers the Bachelor of Science degree in Chemical Engineering. Chemical Engineering students select one of several emphasis areas (such as energy studies or environmental engineering), a concentration in Biomolecular Engineering (to prepare them for medical school or a career in biotechnology), or any approved minor.

Chemical engineering is based on chemistry, biology, physics, and mathematics. The curriculum at Clemson includes classroom and laboratory instruction and emphasizes broadly applicable fundamental principles and current technology to prepare graduates for professional practice and professional growth. Graduates will have careers characterized by success in chemical engineering practice, post-graduate education, or other areas such as medicine and law that make use of engineering skills; demonstrated success in the design of chemical processes and/or identification, formulation, and solution of chemical engineering problems; ethical behavior in all endeavors; demonstrated effectiveness in teamwork, communication, and service to society through their professional contributions; demonstrated technical and/or managerial leadership; and demonstrated commitment to lifelong learning.

Chemical engineers are involved in the research, manufacture, sales, and use of commodity and specialty chemicals, fuels, pharmaceuticals, electronic components, synthetic fibers and textiles, food and consumer goods, and many other products. They work on environmental pollution prevention and remediation and apply engineering science to solve medical and health-related problems.

The Department of Chemical and Biomolecular Engineering also offers advanced study leading to the Master of Science and Doctor of Philosophy degrees. Additional information is available at www.ces.clemson.edu/chemeng.

Freshman Year**First Semester**

- 2 - CES 102 Engineering Disciplines and Skills
- 4 - CH 101 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - Arts and Humanities Requirement¹ or
- 3 - Social Science Requirement¹

16

Second Semester

- 4 - CH 102 General Chemistry
- 3 - CH E 130 Chemical Engineering Tools
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I
- 3 - Arts and Humanities Requirement¹ or
- 3 - Social Science Requirement¹

17

Sophomore Year**First Semester**

- 3 - CH 223 Organic Chemistry
- 4 - CH E 211 Intro. to Chemical Engineering
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II
- 3 - Arts and Humanities Requirement¹ or
- 3 - Social Science Requirement¹

17

Second Semester

- 3 - CH 224 Organic Chemistry
- 1 - CH 229 Organic Chemistry Lab.
- 3 - CH E 220 Chemical Engr. Thermodynamics I
- 4 - CH E 230 Fluids/Heat Transfer
- 4 - MTHSC 208 Intro. to Ordinary Diff. Equations

15

Junior Year**First Semester**

- 1 - CH 339 Physical Chemistry Lab.
- 3 - CH E 307 Unit Operations Lab. I
- 3 - CH E 319 Engineering Materials
- 2 - E C E 307 Basic Electrical Engineering
- 1 - E C E 309 Electrical Engineering Lab. I
- 3 - Arts and Humanities Requirement¹ or
- 3 - Social Science Requirement¹
- 3 - Biochemistry Requirement²

16

Second Semester

- 3 - CH 332 Physical Chemistry
- 1 - CH 340 Physical Chemistry Lab.
- 3 - CH E 321 Chemical Engr. Thermodynamics II
- 4 - CH E 330 Mass Transfer and Separation Proc.
- 3 - Arts and Humanities Requirement¹ or
- 3 - Social Science Requirement¹
- 3 - Emphasis Area Requirement³

17

Senior Year**First Semester**

- 3 - CH E 407 Unit Operations Lab. II
- 3 - CH E 431 Chemical Process Design I
- 1 - CH E 443 Chemical Engr. Senior Seminar I
- 3 - CH E 450 Chemical Reaction Engineering
- 3 - Arts and Humanities Requirement¹ or
- 3 - Social Science Requirement¹
- 3 - Emphasis Area Requirement³

16

Second Semester

- 3 - CH E 353 Process Dynamics and Control
- 3 - CH E 433 Process Design II
- 1 - CH E 444 Chemical Engr. Senior Seminar II
- 3 - MICRO 413 Industrial Microbiology
- 3 - Emphasis Area Requirement³

13

127 Total Semester Hours

¹See Policy on Humanities and Social Sciences for Engineering Curricula. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

²BIOCH 301, 305, or 423

³See advisor for details. Nine credit hours devoted to completion of an emphasis area or approved minor are required. Emphasis areas are Applied Engineering, Mathematics, and Science, Biomolecular Science and Engineering, Business Management, Environmental Engineering, Polymeric Materials, Energy Studies.

Note: No student may exceed a maximum of two attempts, including a W, to complete successfully any CH E course.

BIOMOLECULAR ENGINEERING CONCENTRATION

Freshman Year

First Semester

- 2 - CES 102 Engineering Disciplines and Skills
 - 4 - CH 101 General Chemistry
 - 3 - ENGL 103 Accelerated Composition
 - 4 - MTHSC 106 Calculus of One Variable I
 - 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹
- 16

Second Semester

- 4 - CH 102 General Chemistry
 - 3 - CH E 130 Chemical Engineering Tools
 - 4 - MTHSC 108 Calculus of One Variable II
 - 3 - PHYS 122 Physics with Calculus I
 - 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹
- 17

Sophomore Year

First Semester

- 3 - CH 223 Organic Chemistry
 - 4 - CH E 211 Intro. to Chemical Engineering
 - 4 - MTHSC 206 Calculus of Several Variables
 - 3 - PHYS 221 Physics with Calculus II
 - 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹
- 17

Second Semester

- 3 - BIOCH 301 Molecular Biochemistry
 - 2 - BIOCH 302 Molecular Biochemistry Lab.
 - 3 - CH 224 Organic Chemistry
 - 1 - CH 229 Organic Chemistry Lab.
 - 3 - CH E 220 Chemical Engr. Thermodynamics I
 - 4 - CH E 230 Fluids/Heat Transfer
- 16

Junior Year

First Semester

- 3 - BIOL 103 General Biology I
 - 1 - BIOL 105 General Biology Lab. I
 - 3 - CH E 307 Unit Operations Lab. I
 - 3 - CH E 319 Engineering Materials
 - 4 - MTHSC 208 Intro. to Ordinary Diff. Equations
 - 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹
- 17

Second Semester

- 3 - BIO E 302 Biomaterials
 - 3 - BMOLE 425 Biomolecular Engineering
 - 3 - CH E 321 Chemical Engr. Thermodynamics II
 - 4 - CH E 330 Mass Transfer and Separation Proc.
 - 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹
- 16

Senior Year

First Semester

- 3 - BIOCH 431 Physical Approach to Biochemistry
 - 3 - BMOLE 403 Biotransport Phenomena
 - 3 - CH E 407 Unit Operations Lab. II
 - 3 - CH E 431 Chemical Process Design I
 - 1 - CH E 443 Chemical Engr. Senior Seminar I
 - 3 - CH E 450 Chemical Reaction Engineering
- 16

Second Semester

- 3 - CH E 353 Process Dynamics and Control
 - 3 - CH E 433 Process Design II
 - 1 - CH E 444 Chemical Engr. Senior Seminar II
 - 3 - MICRO 413 Industrial Microbiology
 - 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹
 - 3 - Engineering Requirement²
- 16
- 131 Total Semester Hours

¹See Policy on Humanities and Social Sciences for Engineering Curricula. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

²B E (CH E) 428, BMOLE 423, 426, or 427

Note: No student may exceed a maximum of two attempts, including a W, to complete successfully any CH E course.

CIVIL ENGINEERING

Bachelor of Science

Civil Engineering involves the planning, design, construction management, operation, and maintenance of facilities and systems in the built environment, including bridges, buildings, airports, water supply systems, ports, dams, and highways.

The Bachelor of Science degree program in Civil Engineering includes the common educational goals listed on page 87 for the College of Engineering and Science. The complete objectives of the program can be found at www.ce.clemson.edu.

The first two years provide students with building blocks necessary to be successful civil engineers, including proficiency in calculus, engineering mechanics, physics, and chemistry. During the junior year, students receive a broad introduction to the fundamental areas of civil engineering (structures, hydraulics, geotechnical, transportation, environmental, construction materials, and construction engineering and management). Design experiences are integrated throughout the curriculum, culminating in the senior year with a major capstone design project. In addition, during the senior year, students can select from available emphasis areas that serve to strengthen their undergraduate background.

The Civil Engineering program prepares students to work immediately upon graduation in most areas of civil engineering or to pursue graduate degrees. Students are also exposed to issues related to professional practice, including professional registration, life-long learning, and communication and team skills. Because a concerned society demands a realistic consideration of the impacts of engineering projects, civil engineering students are also educated in the broad areas of the humanities and social sciences.

The Department of Civil Engineering allows eligible students to count up to six hours of graduate credit (600- and 800-level courses) toward both the bachelor's and master's degrees. Students participating in this program must have completed the junior year, must have earned a minimum 3.4 grade-point ratio, and must be approved by the department. Details of the suggested curriculum and program information are available from the department.

Freshman Year

First Semester

- 2 - CES 102 Engineering Disciplines and Skills
 - 4 - CH 101 General Chemistry
 - 3 - ENGL 103 Accelerated Composition
 - 4 - MTHSC 106 Calculus of One Variable I
 - 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹
- 16

Second Semester

- 2 - ENGR 130 Engineering Fundamentals
 - 3 - GEOL 101 Physical Geology
 - 1 - GEOL 103 Physical Geology Lab.
 - 4 - MTHSC 108 Calculus of One Variable II
 - 3 - PHYS 122 Physics with Calculus I
 - 1 - PHYS 124 Physics Lab. I
 - 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹
- 17

Sophomore Year

First Semester

- 3 - C E 201 Statics
 - 2 - E G 210 Intro. to Engr./Computer Graphics
 - 4 - MTHSC 206 Calculus of Several Variables
 - 3 - PHYS 221 Physics with Calculus II
 - 1 - PHYS 223 Physics Lab. II
 - 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹
- 16

Second Semester

- 4 - C E 206 Structural Mechanics
 - 2 - C E 208 Dynamics
 - 3 - C E 255 Geomatics
 - 2 - C E 352 Economic Evaluation of Projects
 - 4 - MTHSC 208 Intro. to Ordinary Diff. Equations
- 15

Junior Year

First Semester

- 3 - C E 301 Structural Analysis
 - 3 - C E 331 Construction Engineering and Mgt.
 - 4 - C E 341 Introduction to Fluid Mechanics
 - 4 - C E 351 Civil Engineering Materials
 - 3 - EX ST 301 Introductory Statistics
- 17

Second Semester

- 3 - C E 311 Transportation Engineering Planning and Design
 - 4 - C E 321 Geotechnical Engineering
 - 3 - C E 342 Applied Hydraulics and Hydrology
 - 1 - C E 353 Professional Seminar
 - 3 - EE&S 401 Environmental Engineering
 - 3 - Design Technical Requirement²
- 17

Senior Year

First Semester

- 3 - ENGL 314 Technical Writing
 - 3 - Design Technical Requirement²
 - 6 - Technical Requirement³
 - 3 - Technical Requirement Restricted³
- 15

Second Semester

- 3 - C E 459 Capstone Design Project
 3 - Arts and Humanities Requirement¹ or
 3 - Social Science Requirement¹
 3 - Arts and Humanities (Literature) Requirement¹
 3 - Technical Requirement¹
 3 - Elective
 15

128 Total Semester Hours

¹See Policy on Humanities and Social Sciences for Engineering Curricula. Six of these credit hours must also satisfy General Education Cross-Cultural Awareness and Science and Technology in Society Requirements.

²See advisor for approved list.

³See advisor for approved list. Technical Requirements and electives may be used to complete an emphasis area in one of the following fields: Applied Fluid Mechanics, Construction, Environmental Engineering, Geotechnical/Geoenvironmental Engineering, Structural Engineering, or Transportation Engineering.

Note: Civil Engineering students may neither enroll in nor receive credit for any C E or E M course unless they have a 2.0 Engineering grade-point ratio and a passing grade in course prerequisites that have a C E or E M designation.

COMPUTER ENGINEERING**Bachelor of Science**

Computer engineers have excellent career opportunities in the design and application of hardware and software components for a variety of computer applications. These include mainframe, desktop, and embedded microprocessor platforms, as well as the networking of various types of computers and peripherals.

Based on a strong foundation in mathematics, computer science, and the physical sciences, the Computer Engineering program includes engineering science and design in circuits, electronics, computer organizations and design, peripheral interfacing, and software engineering. Emphasis is placed on hands-on experience with networked computer systems, micro-, mini-, and mainframe computers, and the solution of a wide range of practical problems using engineering principles. In addition to these technical skills, students learn to communicate effectively and to develop interpersonal, teamwork, and management skills, all of which contribute to success in a professional engineering career. The program is also an excellent preparation for graduate study.

Information on the program and its objectives is available at www.clemson.edu/ces/departments/ece/.

Freshman Year**First Semester**

- 2 - CES 102 Engineering Disciplines and Skills
 4 - CH 101 General Chemistry
 3 - ENGL 103 Accelerated Composition
 4 - MTHSC 106 Calculus of One Variable I
 3 - Arts and Humanities Requirement¹ or
 3 - Social Science Requirement¹
 16

Second Semester

- 3 - ENGR 141 Programming and Problem Solving
 4 - MTHSC 108 Calculus of One Variable II
 3 - PHYS 122 Physics with Calculus I
 6 - Arts and Humanities Requirement¹ or
 6 - Social Science Requirement¹
 16

Sophomore Year**First Semester**

- 3 - CP SC 111 Elementary Computer Programming in C/C++
 2 - E C E 201 Logic and Computing Devices
 3 - E C E 202 Electric Circuits I
 1 - E C E 209 Logic and Computing Devices Lab.
 1 - E C E 211 Electrical Engineering Lab. I
 4 - MTHSC 206 Calculus of Several Variables
 3 - PHYS 221 Physics with Calculus II
 17

Second Semester

- 1 - E C E 212 Electrical Engineering Lab. II
 3 - E C E 222 Systems Programming Concepts for Computer Engineering
 3 - E C E 262 Electric Circuits II
 3 - E C E 272 Computer Organization
 1 - E C E 273 Computer Organization Laboratory
 4 - MTHSC 208 Intro. to Ordinary Diff. Equations
 15

Junior Year**First Semester**

- 3 - E C E 223 Computer Systems Engineering
 1 - E C E 311 Electrical Engineering Lab. III
 3 - E C E 320 Electronics I
 3 - E C E 330 Signals, Systems, and Transforms
 3 - E C E 371 Microcontroller Interfacing
 1 - E C E 372 Microcontroller Interfacing Lab.
 3 - MTHSC 311 Linear Algebra
 17

Second Semester

- 3 - E C E 317 Random Signal Analysis
 3 - E C E (CP SC) 322 Intro. to Operating Systems
 3 - E C E 327 Digital Computer Design
 3 - E C E 352 Programming Systems
 3 - MTHSC 419 Discrete Math. Structures I
 15

Senior Year**First Semester**

- 3 - COMM 150 Intro. to Human Comm. or
 3 - COMM 250 Public Speaking
 3 - E C E 409 Continuous and Discrete Sys. Design
 2 - E C E 495 Integrated System Design I
 3 - ENGL 314 Technical Writing
 6 - Computer Engineering Technical Requirement²
 17

Second Semester

- 2 - E C E 496 Integrated System Design II
 3 - Arts and Humanities (Literature) Requirement¹
 3 - Arts and Humanities Requirement¹ or
 3 - Social Science Requirement¹
 6 - Computer Engr. Depth Tech. Requirement²
 14

127 Total Semester Hours

¹See Policy on Humanities and Social Sciences for Engineering Curricula. Six of these credit hours must also satisfy General Education Cross-Cultural Awareness and Science and Technology in Society Requirements.

²Select from department-approved list.

³Select from ENGL 202, 210, 211, 212, 213, 214, or 215.

Notes

1. A student is allowed to enroll in E C E courses excluding E C E 307, 308, 309 only when all prerequisites have been passed with a grade of C or better.

2. All Computer Engineering students must have a cumulative engineering grade-point ratio of 2.0 to enroll in any 300- or 400-level E C E courses.

3. No student may exceed a maximum of two attempts, excluding a 'W', to complete successfully any E C E course.

ELECTRICAL ENGINEERING**Bachelor of Science**

Electrical engineers are in high demand for a wide range of influential positions. Professional duties range from analytical problem solving to the design of components and systems. The scope of employment requires a unique breadth and depth of knowledge and technical skills, which are reflected in the Electrical Engineering program. This program also offers an excellent preparation for graduate education. Detailed information can be found at www.clemson.edu/ces/departments/ece/.

Building on a foundation of mathematical and physical sciences, students progress into the application of these in the engineering science areas of circuits, electronics, communications, controls, power, and electromagnetics. In these subjects, students also begin to apply the concepts and techniques learned to the design of circuits and systems. Senior technical design courses offer the opportunity to further develop expertise in a selected area.

In addition to these technical skills, students learn to communicate effectively, both orally and with the written word. Because engineers work for the benefit of society, the curriculum includes a strong component of humanities and social science courses. Also, many project design assignments enable the development of interpersonal, teamwork, and management skills, which are necessary for success in a professional engineering career.

Freshman Year**First Semester**

- 2 - CES 102 Engineering Disciplines and Skills
 4 - CH 101 General Chemistry
 3 - ENGL 103 Accelerated Composition
 4 - MTHSC 106 Calculus of One Variable I
 3 - Arts and Humanities Requirement¹ or
 3 - Social Science Requirement¹
 16

Second Semester

- 4 - CH 102 General Chemistry
 3 - ENGR 141 Programming and Problem Solving
 4 - MTHSC 108 Calculus of One Variable II
 3 - PHYS 122 Physics with Calculus I
 3 - Arts and Humanities Requirement¹ or
 3 - Social Science Requirement¹
 17

Sophomore Year

First Semester

- 3 - CP SC 111 Elementary Computer Programming in C/C++
- 2 - E C E 201 Logic and Computing Devices
- 3 - E C E 202 Electric Circuits I
- 1 - E C E 209 Logic and Computing Devices Lab.
- 1 - E C E 211 Electrical Engineering Lab. I
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II

17

Second Semester

- 1 - E C E 212 Electrical Engineering Lab. II
- 3 - E C E 262 Electric Circuits II
- 3 - E C E 272 Computer Organization
- 1 - E C E 273 Computer Organization Laboratory
- 4 - MTHSC 208 Intro. to Ordinary Diff. Equations
- 3 - Arts and Humanities Requirement¹ or
- 3 - Social Science Requirement¹ or
- 3 - Electrical Engineering Technical Req.^{2,3}

15

Junior Year

First Semester

- 1 - E C E 311 Electrical Engineering Lab. III
- 3 - E C E 320 Electronics I
- 3 - E C E 330 Signals, Systems, and Transforms
- 3 - E C E 371 Microcontroller Interfacing
- 1 - E C E 372 Microcontroller Interfacing Lab.
- 3 - E C E 380 Electromagnetics
- 3 - Advanced Mathematics Requirement⁴

17

Second Semester

- 1 - E C E 312 Electrical Engineering Lab. IV
- 3 - E C E 317 Random Signal Analysis
- 3 - E C E 321 Electronics II
- 3 - E C E 360 Electric Power Engineering
- 3 - E C E 381 Fields, Waves, and Circuits
- 3 - ENGL 314 Technical Writing

16

Senior Year

First Semester

- 3 - COMM 150 Intro. to Human Comm. or
- 3 - COMM 250 Public Speaking
- 3 - E C E 409 Continuous and Discrete Syst. Des.
- 3 - E C E 427 Communications Systems
- 2 - E C E 495 Integrated Systems Design I
- 3 - Electrical Engineering Technical Req.³

14

Second Semester

- 2 - E C E 496 Integrated System Design II
- 6 - Arts and Humanities Requirement¹ or
- 6 - Social Science Requirement¹
- 3 - Arts and Humanities Requirement¹ or
- 3 - Social Science Requirement¹ or
- 3 - Electrical Engineering Technical Req.³
- 3 - Electrical Engineering Technical Req. Depth³

14

126 Total Semester Hours

²Students may enroll in E C E 222 for a common semester with Computer Engineering. Those not selecting this option should complete the Electrical Engineering Technical Requirement in the senior year.

³Select from department-approved list.

⁴MTHSC 434, 435, 453, or 454

Notes:

1. A student is allowed to enroll in E C E courses (excluding E C E 307, 308, 309) only when all prerequisites have been passed with a grade of C or better.

2. All Electrical Engineering students must have a cumulative engineering grade-point ratio of 2.0 to enroll in any 300- or 400-level E C E courses.

3. No student may exceed a maximum of two attempts, excluding a W, to complete successfully any E C E course.

ENVIRONMENTAL ENGINEERING

Bachelor of Science

Our complex world faces many challenges, including contaminated water supplies, hazardous wastes, an increasing population and limited resources. Environmental engineers help to solve many of the environmental problems faced by society using the principles of biology, chemistry, physics, mathematics and earth sciences. An undergraduate degree in Environmental Engineering opens the door to a variety of rewarding career options. Environmental engineers protect water quality by designing water and wastewater treatment systems; ensure public safety by managing solid, hazardous and radioactive wastes; improve air quality by controlling emissions from mobile and stationary sources; reduce human health risks by tracking contaminants as they move through the environment; clean up toxic waste spills and restore historically contaminated sites; and design a more sustainable future by understanding our use of resources.

The curriculum for the Bachelor of Science degree in Environmental Engineering consists of 128-130 credit hours and the Natural Systems Concentration also consists of 128-130 credit hours. The first two years of the program are common for all students enrolled in the degree. In the junior and senior years, students may select a core curriculum that emphasizes areas traditionally associated with environmental engineering, such as water and wastewater management, solid and hazardous waste management, air pollution control, pollution prevention and risk assessment. Alternatively, students entering their junior year may choose the Natural Systems Concentration, which places a greater emphasis on environmental processes in natural environments. All students participate in two professional seminar courses and complete a capstone design project.

Freshman Year

First Semester

- 2 - CES 102 Engineering Disciplines and Skills
- 4 - CH 101 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - Arts and Humanities Requirement¹ or
- 3 - Social Science Requirement¹

16

Second Semester

- 4 - CH 102 General Chemistry
- 2 - ENGR 130 Engineering Fundamentals
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I
- 3 - Arts and Humanities Requirement¹ or
- 3 - Social Science Requirement¹

16

Sophomore Year

First Semester

- 3 - BIOL 103 General Biology and
- 1 - BIOL 105 General Biology Laboratory or
- 5 - BIOL 110 Principles of Biology
- 3 - C E 201 Statics
- 3 - EE&S 201 Environmental Engineering Fund. I
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II

17-18

Second Semester

- 4 - CH 201 Survey of Organic Chemistry or
- 3 - CH 223 Organic Chemistry and
- 1 - CH 227 Organic Chemistry Laboratory
- 2 - C E 208 Dynamics
- 2 - E G 210 Comp.-Aided Design and Engr. Apps.²
- 4 - EE&S 202 Environmental Engineering Fund. II
- 4 - MTHSC 208 Intro. to Ordinary Diff. Equations

16

Junior Year

First Semester

- 4 - C E 341 Introduction to Fluid Mechanics
- 3 - EE&S 430 Air Pollution Engineering
- 4 - MICRO 305 General Microbiology³
- 3 - Arts and Humanities Requirement¹ or
- 3 - Social Science Requirement¹
- 3 - Statistics Requirement⁴

17-18

Second Semester

- 3 - EE&S 402 Water and Wastewater Treatment
- 3 - EE&S 484 Municipal Solid Waste Mgt.
- 3 - M E 310 Thermodynamics and Heat Transfer
- 4 - Earth Science Requirement⁵
- 2 - Engineering Economics Requirement⁶
- 3 - Arts and Humanities Requirement¹ or
- 3 - Social Science Requirement¹

18

Senior Year

First Semester

- 1 - EE&S 450 Environ. Engr. Senior Seminar
- 3 - EE&S 480 Environmental Risk Assessment
- 3 - EE&S 486 Pollution Prevention
- 5 - Engineering or Science Requirement⁷
- 3 - Arts and Humanities Requirement¹ or
- 3 - Social Science Requirement¹

15

Second Semester

- 1 - B E (EE&S) 451 Newman Seminar and Lecture Series in Natural Resources Engineering
- 3 - EE&S 475 Capstone Design Project
- 3 - EE&S 485 Hazardous Waste Management
- 6 - Engineering or Science Requirement⁷

13

128-130 Total Semester Hours

¹See Policy on Humanities and Social Sciences for Engineering Curricula. Six of these credit hours must also satisfy General Education Cross-Cultural Awareness and Science and Technology in Society Requirements.

¹See Policy on Humanities and Social Sciences for Engineering Curricula. HIST 124 is required and satisfies the Science and Technology in Society General Education Requirement and three hours of the Social Science General Education Requirement. Three of these credit hours must also satisfy General Education Cross-Cultural Awareness Requirement. Students are encouraged to select PHIL 345 to fulfill the Arts and Humanities (Non-Literature) General Education Requirement.

²E G 209 may be substituted.

³BIOSC 210 may be substituted. Students selecting this option must make up one hour in any manner they choose.

⁴Select from EX ST 301, GEOL 211 or MTHSC 302.

⁵Select GEOL 101 and 103, or CSENV 202.

⁶Select C E 352 or I E 384.

⁷Choose any combination of engineering and/or sciences courses from a department-approved list.

NATURAL SYSTEMS CONCENTRATION

Freshman Year

First Semester

- 2 - CES 102 Engineering Disciplines and Skills
- 4 - CH 101 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹

16

Second Semester

- 4 - CH 102 General Chemistry
- 2 - ENGR 130 Engineering Fundamentals
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹

16

Sophomore Year

First Semester

- 3 - BIOL 103 General Biology and
- 1 - BIOL 105 General Biology Laboratory or
5 - BIOL 110 Principles of Biology
- 3 - C E 201 Statics
- 3 - EE&S 201 Environmental Engineering Fund. I
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II

17-18

Second Semester

- 4 - CH 201 Survey of Organic Chemistry or
3 - CH 223 Organic Chemistry and
1 - CH 227 Organic Chemistry Laboratory
- 2 - C E 208 Dynamics
- 2 - E G 210 Comp.-Aided Design and Engr. Apps.²
- 4 - EE&S 202 Environmental Engineering Fund. II
- 4 - MTHSC 208 Intro. to Ordinary Diff. Equations

16

Junior Year

First Semester

- 4 - C E 341 Introduction to Fluid Mechanics
- 4 - CSENV 202 Soils
- 4 - MICRO 305 General Microbiology³
- 3 - Natural Systems Engineering Requirement⁴
- 3 - Statistics Requirement⁵

18-19

Second Semester

- 3 - B E 322 Small Watershed Hydro./Sediment.
- 4 - B E 415 Instrumentation and Controls
- 3 - EE&S 402 Water and Wastewater Treatment
- 3 - M E 310 Thermodynamics and Heat Transfer
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹

16

Senior Year

First Semester

- 3 - B E (CSENV) 408 Land Treatment of
Wastewater and Sludges
- 1 - EE&S 450 Environ. Engr. Senior Seminar
- 3 - GEOL 421 GIS Applications in Geology
- 3 - Environmental Engineering Requirement⁶
- 3 - Natural Systems Engineering Requirement⁴
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹

16

Second Semester

- 1 - B E (EE&S, FOR) 451 Newman Seminar and
Lecture Series in Natural Resources Engineering
- 3 - EE&S 475 Capstone Design Project
- 3 - EE&S 485 Hazardous Waste Management
- 3 - Natural Systems Engineering Requirement⁴
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹

13

128-130 Total Semester Hours

¹See Policy on Humanities and Social Sciences for Engineering Curricula. HIST 124 is required and satisfies the Science and Technology in Society General Education Requirement and three hours of the Social Science General Education Requirement. Three of these credit hours must also satisfy General Education Cross-Cultural Awareness Requirement. Students are encouraged to select PHIL 345 to fulfill the Arts and Humanities (Non-Literature) General Education Requirement.

²E G 209 may be substituted.

³BIOSC 210 may be substituted. Students selecting this option must make up one hour in any manner they choose.

⁴Select from B E 422, 424, 464 or C E 482.

⁵Select from EX ST 301, GEOL 211 or MTHSC 302.

⁶Select from EE&S 480, 484, 486.

INDUSTRIAL ENGINEERING

Bachelor of Science

Industrial engineers design, install, and improve the complex systems that provide goods and services vital to our society and economy. These systems place unique demands for breadth of preparation on industrial engineers. Baccalaureate degree graduates demonstrate the ability to design, develop, implement, and improve integrated systems that include people, materials, information, equipment, and energy. Graduates demonstrate the ability to apply the principles and techniques of industrial engineering analysis and design supported by a foundation in mathematical, physical, and social sciences, and economic, operational, and engineering analyses. Graduates possess a breadth of knowledge that allows them to practice industrial engineering with an appropriate awareness of information issues in systems improvement. In addition, graduates are able to work and communicate effectively with colleagues at every level in an organization.

The traditional arenas for the practice of industrial engineering are the manufacturing facilities of industry; however, many practicing industrial engineers are employed in non-manufacturing institutions such as hospitals, banks, and government agencies. In addition to numerous employment opportunities in professional practice, industrial engineering graduates may further their formal education. The Department of Industrial Engineering offers programs leading to the Master of Science and Doctor of Philosophy degrees.

The Department of Industrial Engineering allows students to count up to 12 hours of graduate credit (approved 600- and 800-level courses) toward both the bachelor's and master's degrees. Students participating in this program must have a minimum grade-point ratio of 3.4 and be admitted to the Graduate School prior to registering for graduate courses. Details of the suggested curriculum and program information are available from the Industrial Engineering Department.

Detailed curriculum and department information is available at www.ces.clemson.edu/ie.

Freshman Year

First Semester

- 2 - CES 102 Engineering Disciplines and Skills
- 4 - CH 101 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹

16

Second Semester

- 3 - ENGR 141 Programming and Problem Solving
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹
- 4 - Lab Science Requirement²

17

Sophomore Year

First Semester

- 1 - I E 200 Sophomore Seminar in I E
- 4 - I E 201 System Design I
- 3 - I E 280 Methods of Operational Research I
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II
- 1 - PHYS 223 Physics Lab. II¹

16

Second Semester

- 3 - C M E 210 Introduction to Materials Science
- 3 - C E 201 Statics⁴
- 2 - E G 208 Engineering Graphics with Computer Applications or
2 - E G 209 Introduction to Engineering Computer Graphics
- 3 - I E 210 Design and Analysis of Work Systems
- 3 - I E 384 Engineering Economic Analysis
- 3 - Arts and Humanities Requirement⁵ or
3 - Social Science Requirement⁵

17

Junior Year

First Semester

- 2 - C E 208 Dynamics⁴
- 3 - I E 360 Ind. Appl. of Probability and Statistics
- 1 - I E 368 Professional Practice in I E
- 3 - I E 440 Decision Support Systems in I E
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹
- 3 - Mathematics or Natural Science Req.²

15

Second Semester

- 3 - COMM 150 Intro. to Human Comm. or
3 - COMM 250 Public Speaking
- 2 - E C E 307 Basic Electrical Engineering
- 1 - E C E 309 Electrical Engineering Lab. I
- 3 - I E 361 Industrial Quality Control
- 3 - I E 381 Methods of Operational Research II
- 3 - I E 386 Production Planning and Control

15

Senior Year

First Semester

- 3 - I E 461 Quality Engineering
- 3 - I E 465 Facilities Planning and Design
- 4 - I E 482 Systems Modeling
- 3 - Engineering Requirement²
- 3 - Technical Requirement²

16

Second Semester

- 3 - I E 467 Systems Design II
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹
- 3 - Management Requirement²
- 3 - Technical Requirement²

12

124 Total Semester Hours

¹See policy on Humanities and Social Sciences for Engineering curricula.

²Select from department-approved list. See advisor.

³PHYS 124 may be substituted.

⁴M E 201 may be substituted for C E 201 and 208; E M 202 may be substituted for C E 208.

MECHANICAL ENGINEERING

Bachelor of Science

Breadth, individuality, and flexibility are inherent characteristics of the mechanical engineering profession. Mechanical engineers, in a broad sense, make major contributions to the creation of products and systems that benefit mankind. They work in a variety of areas, including bioengineering, energy systems, environmental and life-support systems, propulsion and transportation systems, food production, materials processing, automated manufacturing, and construction. A wide spectrum of career opportunities is open to them. The practice of mechanical engineering includes one or more of the following activities: manufacturing, testing, research, development, design, technical management, technical sales and marketing, construction, and teaching.

Preparation for a 40-45-year professional career requires development of the whole person through a balanced program encompassing the humanities, social sciences, communication and computer skills, physical and engineering sciences, design, and laboratory experience. Students start with the physical sciences and communication skills and progress through the engineering sciences, ultimately applying the principles learned in such areas as energy conversion and transfer, mechanical design, and systems analysis. Throughout the curriculum, the fundamental nature of engineering as a problem-solving discipline is emphasized.

Most graduates take positions in industry, government, or business. Many, however, continue their formal education in a graduate program. The Department of Mechanical Engineering offers study leading to the Master of Science and Doctor of Philosophy degrees.

Mechanical Engineering students who have a cumulative grade-point ratio or cumulative engineering grade-point ratio (EGPR) below 2.0 are on probation and will have restricted enrollment in classes. Students whose cumulative grade-point ratio is below 2.0 are subject to the regulations stipulated under *Academic Eligibility Policy*. Students on probation for EGPR below 2.0 who fail to recover in the first regular semester (fall or spring) will not be allowed to register for mechanical engineering classes. After one year, such students may petition the Mechanical Engineering Department for continued enrollment. An advising policy for students on probation is available from the Mechanical Engineering Department.

Additional information can be found at www.ces.clemson.edu/me.

Freshman Year

First Semester

- 2 - CES 102 Engineering Disciplines and Skills
- 4 - CH 101 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹

16

Second Semester

- 2 - E G 208 Engineering Graphics with Computer Applications
- 3 - ENGR 141 Programming and Problem Solving
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I
- 1 - PHYS 124 Physics Lab. I
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹

16

Sophomore Year

First Semester

- 5 - M E 201 Statics and Dynamics for Mech. Engr.
- 2 - M E 222 Mechanical Engineering Lab. I
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II
- 3-5 - Science Requirement²

17-19

Second Semester

- 2 - E C E 307 Basic Electrical Engineering
- 1 - E C E 309 Electrical Engineering Lab. I
- 3 - M E 202 Foundations of Mechanical Systems
- 3 - M E 203 Found. of Thermal and Fluid Systems
- 4 - MTHSC 208 Intro. to Ordinary Diff. Equations
- 3 - Numerical Analysis Requirement²

16

Junior Year

First Semester

- 3 - M E 302 Mechanics of Materials
- 3 - M E 303 Thermodynamics
- 3 - M E 305 Model. and Analysis of Dynamic Syst.
- 3 - M E 308 Fluid Mechanics
- 2 - M E 333 Mechanical Engineering Lab. II
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹

17

Second Semester

- 3 - M E 304 Heat Transfer
- 3 - M E 306 Fundamentals of Machine Design
- 3 - M E 312 Manufacturing Proc. and Their Appl.
- 3 - Departmental Requirement²
- 3 - Statistics Requirement²

15

Senior Year

First Semester

- 3 - M E 401 Mechanical Engineering Design
- 3 - M E 403 Control and Integration of Multi-Domain Dynamic Systems
- 2 - M E 444 Mechanical Engineering Lab. III
- 6 - Technical Requirement²

14

Second Semester

- 1 - M E 400 Senior Seminar
- 3 - M E 402 Internship in Engineering Design
- 6 - Arts and Humanities Requirement¹ or
6 - Social Science Requirement¹
- 3 - Technical Requirement²

13

124-126 Total Semester Hours

¹See Policy on Humanities and Social Sciences for Engineering Curricula. Six of these credit hours must also satisfy General Education Cross-Cultural Awareness and Science and Technology in Society Requirements.

²See advisor. Select from department-approved list.

Notes:

1. A student is allowed to enroll in any M E course only when all prerequisites, as defined by current official listings for that course, have been passed with a grade of C or higher.
2. No student may exceed three attempts to complete successfully M E 201, 202, or 203. Registration for a third attempt to complete one of these M E courses requires the approval of the undergraduate coordinator in the Department of Mechanical Engineering. A grade of W counts as an unsuccessful attempt at completing the course.
3. For students repeating an M E course, registration preference will be given to students in a degree-granting engineering major whose curriculum requires the course in question.

SCIENCE PROGRAMS

The College of Engineering and Science offers curricula leading to the Bachelor of Science in Chemistry, Computer Information Systems, Computer Science, Geology, Mathematical Sciences, Physics, and Polymer and Fiber Chemistry. The Bachelor of Arts is offered in Chemistry, Computer Science, Geology, Mathematical Sciences, and Physics.

The science departments in the College work closely with the other academic departments in the University, including such disciplines as economics and management as well as engineering. This allows students in the sciences great flexibility and responsibility in designing their own programs.

Bachelor of Science Curricula

The Bachelor of Science degree prepares graduates for professional employment or graduate study in the chosen science discipline. BS curricula are more highly structured than BA curricula but nonetheless offer opportunity for students to pursue a minor or secondary area of interest.

Bachelor of Arts Curricula

The curricula leading to the Bachelor of Arts degree are designed to meet the needs of students who desire a broad general education. They require a minor (or a second major) as well as the major concentration. A major requires a minimum of 24 credits from courses above the sophomore level, including or in addition to courses specified by the major department. In some major disciplines, certain prescribed courses at the sophomore level are counted toward the 24-credit requirement.

Students have a large degree of flexibility and responsibility in selecting a minor from those listed on page 106. Courses for these minors are to be selected in consultation with the appropriate department.

CHEMISTRY

Bachelor of Science

Chemistry, an experimental discipline based on observation guided by molecular theory, is of fundamental importance in much of modern science and technology. Its molecular concepts form the basis for ideas about complex material behavior. Due to the fundamental nature and extensive application of chemistry, an unusually large variety of challenging opportunities to contribute in the science-oriented community are open to students whose education is built around the principles of this discipline.

The Chemistry curriculum, through the career requirement options and the large number of electives, provides students the opportunity to select a coherent program of study beyond the basic courses. Career requirement options are provided for students anticipating graduate study in chemistry or related fields; employment following the BS degree in laboratory, production, technical sales, or management positions; professional studies (e.g., medicine); chemical physics; geochemistry; and employment in fields requiring extensive preparation in courses other than sciences (e.g., patent law and technical writing). Significant features of the curriculum are the student's extensive

participation in experimental work and the opportunity to take part in a research investigation during the junior and senior years.

Freshman Year

First Semester

- 4 - CH 101 General Chemistry
- 1 - CH 141 Chemistry Orientation
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹

15

Second Semester

- 4 - CH 102 General Chemistry
- 2 - CH 152 Chemistry Communication I
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹

16

Sophomore Year

First Semester

- 3 - CH 223 Organic Chemistry
- 1 - CH 227 Organic Chemistry Lab.
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II
- 1 - PHYS 223 Physics Lab. II
- 4 - Foreign Language Requirement²

16

Second Semester

- 3 - CH 205 Introduction to Inorganic Chemistry
- 3 - CH 224 Organic Chemistry
- 1 - CH 228 Organic Chemistry Lab.
- 4 - MTHSC 208 Intro. to Ordinary Diff. Equations
- 3 - PHYS 222 Physics with Calculus III
- 1 - PHYS 224 Physics Lab. III

15

Junior Year

First Semester

- 3 - BIOCH 301 Molecular Biochemistry or
3 - BIOCH 305 Essential Elements of Bioch.
- 3 - CH 313 Quantitative Analysis
- 2 - CH 315 Quantitative Analysis Lab.
- 3 - CH 331 Physical Chemistry
- 1 - CH 339 Physical Chemistry Lab.
- 3 - ENGL 314 Technical Writing

15

Second Semester

- 3 - CH 332 Physical Chemistry
- 1 - CH 340 Physical Chemistry Lab.
- 3 - CH 411 Instrumental Analysis
- 2 - CH 412 Instrumental Analysis Lab.
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - Elective

15

Senior Year

First Semester

- 3 - CH 402 Inorganic Chemistry
- 2 - CH 403 Advanced Synthetic Techniques
- 3 - CH 443 Research Problems
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹
- 3 - Chemistry Requirement¹

14

Second Semester

- 3 - CH 444 Research Problems
- 3 - CH 450 Chemistry Capstone
- 1 - CH 452 Chemistry Communication II
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹
- 3 - Chemistry Requirement¹
- 3 - Elective

16

122 Total Semester Hours

¹See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

²One semester (through 102) in any modern foreign language is required.

³See advisor.

CHEMISTRY

Bachelor of Arts

Freshman Year

First Semester

- 4 - CH 101 General Chemistry
- 1 - CH 141 Chemistry Orientation
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹

15

Second Semester

- 4 - CH 102 General Chemistry
- 2 - CH 152 Chemistry Communication I
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I
- 3 - Arts and Humanities Requirement¹ or
3 - Social Science Requirement¹

16

Sophomore Year

First Semester

- 3 - CH 223 Organic Chemistry
- 1 - CH 227 Organic Chemistry Lab.
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II
- 4 - Foreign Language Requirement²

15

Second Semester

- 3 - CH 205 Introduction to Inorganic Chemistry
- 3 - CH 224 Organic Chemistry
- 1 - CH 228 Organic Chemistry Lab.
- 6 - Arts and Humanities Requirement¹ or
6 - Social Science Requirement¹
- 4 - Foreign Language Requirement²

17

Junior Year**First Semester**

- 3 - CH 313 Quantitative Analysis
- 1 - CH 317 Quantitative Analysis Lab.
- 3 - Arts and Humanities Requirement¹ or
- 3 - Social Science Requirement¹
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - Foreign Language Requirement²
- 3 - Minor Requirement

16

Second Semester

- 3 - CH 331 Physical Chemistry
- 3 - ENGL 314 Technical Writing
- 3 - Arts and Humanities Requirement¹ or
- 3 - Social Science Requirement¹
- 3 - Foreign Language Requirement²
- 3 - Minor Requirement

15

Senior Year**First Semester**

- 3 - CH 332 Physical Chemistry
- 3 - Chemistry Requirement³
- 3 - Minor Requirement
- 6 - Elective

15

Second Semester

- 3 - CH 450 Chemistry Capstone
- 1 - CH 452 Chemistry Communication II
- 3 - Chemistry Requirement³
- 6 - Minor Requirement

13

122 Total Semester Hours

¹See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

²Four semesters (through 202) of the same modern foreign language are required.

³See advisor.

COMPUTER INFORMATION SYSTEMS**Bachelor of Science**

The Computer Information Systems degree program is oriented toward computer applications in management-related problems. The program emphasizes functional areas of management, including accounting, production, marketing, and finance and the applications of computers in these areas. The curriculum is designed to prepare students for careers in areas such as systems design and analysis, applications programming, database administration, and information retrieval, as well as for continued study toward an advanced degree.

Students who change majors into Computer Information Systems must have a cumulative grade-point ratio of 2.0 or higher.

Additional information can be found at www.cs.clemson.edu.

Freshman Year**First Semester**

- 4 - CP SC 101 Computer Science I
- 3 - ENGL 103 Accelerated Composition
- 3 - MTHSC 102 Intro. to Mathemat. Analysis¹ and
- 1 - Elective¹ or
- 4 - MTHSC 106 Calculus of One Variable I¹
- 4 - Natural Science Requirement²

15

Second Semester

- 4 - CP SC 102 Computer Science II
- 3 - MTHSC 207 Multivariable Calculus¹ and
- 1 - Elective¹ or
- 4 - MTHSC 108 Calculus of One Variable II¹
- 3 - Arts and Humanities (Non-Lit.) Requirement³
- 3 - Natural Science Requirement²
- 3 - Social Science Requirement³

17

Sophomore Year**First Semester**

- 3 - CP SC 207 Discrete Structures for Computing
- 4 - CP SC 212 Algorithms and Data Structures
- 3 - Arts and Humanities (Literature) Requirement³
- 3 - Oral Communication Requirement³
- 3 - Social Science Requirement³

16

Second Semester

- 3 - CP SC 215 Software Development Foundations
- 4 - CP SC 231 Intro. to Computer Organization
- 1 - CP SC 291 Seminar in Professional Issues I
- 3 - MGT 201 Principles of Management
- 3 - Probability and Statistics Requirement⁴

14

Junior Year**First Semester**

- 3 - ACCT 201 Financial Accounting Concepts
- 3 - CP SC 322 Introduction to Operating Systems
- 3 - CP SC 372 Introduction to Software Engineering
- 3 - MTHSC 311 Linear Algebra
- 3 - Writing Requirement⁵

15

Second Semester

- 3 - ACCT 202 Managerial Accounting Concepts
- 3 - CP SC 360 Networks and Network Program.
- 3 - CP SC 371 Systems Analysis or
- 3 - MGT 452 Systems Analysis and Design
- 3 - ECON 211 Principles of Microeconomics
- 3 - Computer Science Requirement⁶

15

Senior Year**First Semester**

- 3 - CP SC 420 Computer Security Principles or
- 3 - CP SC 424 System Admin. and Security
- 3 - CP SC 462 Database Management Systems
- 3 - CP SC 491 Seminar in Professional Issues II
- 3 - Business Requirement⁷
- 3 - Computer Science Requirement⁶

15

Second Semester

- 3 - MGT 312 Decision Models for Management
- 3 - MKT 301 Principles of Marketing
- 3 - Business Requirement⁷
- 3 - Computer Science Requirement⁶
- 3 - Information Systems Requirement⁸

15

122 Total Semester Hours

¹Select either the MTHSC 102/207 or 106/108 sequence. Students who select the 106/108 sequence will have satisfied the two elective credits in the freshman year.

²Select from courses in BIOL, BIOCH, BIOSC, CH, GEOL, MICRO, PHYS; or EN SP 200. At least one course must include a laboratory and satisfy the Natural Science General Education Requirement.

³See General Education Requirements.

⁴MTHSC 301, 302, or 309.

⁵Select from School-approved list.

⁶Select from 300-level or higher CP SC courses. No more than six credits of CP SC 481 may be used.

⁷Select from MGT 390, 400, FIN 306.

⁸Select from MGT 452, 454, 455, 456, or 400-level CP SC courses. CP SC 481 may not be used.

Notes:

1. For graduation, a candidate for the BS degree in Computer Information Systems must have earned a grade of C or better in each CP SC course applied to the degree.

2. A grade of C or better must be earned in all prerequisite courses (including CP SC and MTHSC courses) before enrolling in the next CP SC course.

COMPUTER SCIENCE**Bachelor of Science**

The Computer Science program is oriented toward design, implementation, and application of software systems to solve information processing problems. Emphasis areas outside computer science allow students to tailor the program to their individual needs and interests. This program is more technically oriented than the Computer Information Systems curriculum. It prepares students for employment in the computer software field or for continued study toward an advanced degree in computer science. This program is accredited by the Computing Accreditation Commission (CAC) of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012; telephone: (410) 347-7700. Additional information can be found at www.cs.clemson.edu.

Students who change majors into Computer Science must have a cumulative grade-point ratio of 2.0 or higher.

Combined Bachelor's/Master's Plan

The School of Computing allows students to count up to nine hours of graduate credit (600- and 800-level courses) toward both the bachelor's and master's degrees. Students participating in this program must have a minimum grade-point ratio of 3.4 and be admitted to the Graduate School prior to registering for graduate courses. Details of the suggested curriculum and program information are available from the Department.

Freshman Year

First Semester

- 4 - CP SC 101 Computer Science I
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 106 Calculus of One Variable I
- 4 - Natural Science Requirement¹

15

Second Semester

- 4 - CP SC 102 Computer Science II
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - Arts and Humanities (Non-Lit.) Requirement²
- 4 - Natural Science Requirement¹

15

Sophomore Year

First Semester

- 3 - CP SC 207 Discrete Structures for Computing
- 4 - CP SC 212 Algorithms and Data Structures
- 3 - Arts and Humanities (Literature) Requirement²
- 3 - Natural Science Requirement¹
- 3 - Oral Communication Requirement²

16

Second Semester

- 3 - CP SC 215 Software Development Foundations
- 4 - CP SC 231 Intro. to Computer Organization
- 3 - CP SC 291 Seminar in Professional Issues I
- 3 - Natural Science Requirement¹
- 4 - Probability and Statistics Requirement³
- 2 - Elective

16

Junior Year

First Semester

- 3 - CP SC 330 Computer Systems Organization
- 3 - CP SC 360 Networks and Network Program.
- 3 - CP SC 372 Introduction to Software Engineering
- 3 - MTHSC 311 Linear Algebra
- 3 - Social Science Requirement²

15

Second Semester

- 3 - CP SC 322 Introduction to Operating Systems
- 3 - CP SC 350 Foundations of Computer Science
- 3 - CP SC 362 Distributed and Cluster Computing
- 3 - Arts and Humanities Requirement⁴ or
- 3 - Social Science Requirement⁴
- 3 - Social Science Requirement²

15

Senior Year

First Semester

- 3 - CP SC 352 Programming Languages
- 3 - Computer Science Requirement⁵
- 3 - Writing Requirement⁶
- 3 - Elective

15

Second Semester

- 3 - CP SC 491 Seminar in Professional Issues II
- 3 - Arts and Humanities Requirement⁴ or
- 3 - Social Science Requirement⁴
- 3 - Computer Science Requirement⁵
- 4 - Elective

15

122 Total Semester Hours

¹Two-semester sequence in the same physical or biological science, each including a laboratory, is required. Select from BIOL 103/105, 104/106; 110, 111; CH 101, 102; GEOL 101/103 and 102 or 112/114; PHYS 122/124, 221/223. The six remaining hours may be selected from BIOL, BIOCH, BIOSC, CH, GEOL, MICRO, PHYS; or EN SP 200.

²See General Education Requirements.

³MTHSC 301, 302 or 309.

⁴Select from courses in A A H, ANTH, ART, CHIN, COMM, DANCE, E A S, ECON, ENGL, FR, GEOG, GER, HIST, HUM, ITAL, JAPN, MUSIC, P A, P A S, PHIL, PO SC, PSYCH, REL, RUSS, SOC, SPAN, THEA, W S.

⁵Select from 300-level or higher CP SC courses. No more than six credits of CP SC 481 may be applied to this requirement. Up to three credits of approved 300-level or higher MTHSC or E C E courses may be substituted.

⁶Select from School-approved list.

Notes:

1. For graduation, a candidate for the BS degree in Computer Science must have earned a grade of C or better in each CP SC course applied to the degree.

2. A grade of C or better must be earned in all prerequisite courses (including CP SC and MTHSC courses) before enrolling in the next CP SC course.

COMPUTER SCIENCE

Bachelor of Arts

The Bachelor of Arts in Computer Science is ideal for students interested in acquiring a broad-based liberal arts education that includes a strong and solid understanding of computer science. The curriculum is oriented toward design, implementation, and application of computer software systems to solve information processing problems. The program prepares students for employment in the computer software field or for continued study toward an advanced degree in computer science. Additional information can be found at www.cs.clemson.edu.

Students who change majors into Computer Science must have a cumulative grade-point ratio of 2.0 or higher.

Freshman Year

First Semester

- 4 - CP SC 101 Computer Science I
- 3 - ENGL 103 Accelerated Composition
- 3 - MTHSC 102 Intro. to Mathemat. Analysis¹ and
- 1 - Elective¹ or
- 4 - MTHSC 106 Calculus of One Variable I¹
- 4 - Foreign Language Requirement²

15

Second Semester

- 4 - CP SC 102 Computer Science II
- 3 - MTHSC 207 Multivariable Calculus¹ and
- 1 - Elective¹ or
- 4 - MTHSC 108 Calculus of One Variable II¹
- 3 - Arts and Humanities (Non-Lit.) Req.³
- 4 - Foreign Language Requirement²

15

Sophomore Year

First Semester

- 3 - CP SC 207 Discrete Structures for Computing
- 4 - CP SC 212 Algorithms and Data Structures
- 3 - Arts and Humanities (Literature) Requirement³
- 3 - Foreign Language Requirement²
- 3 - Oral Communication Requirement³

16

Second Semester

- 3 - CP SC 215 Software Development Foundations
- 4 - CP SC 231 Intro. to Computer Organization
- 1 - CP SC 291 Seminar in Professional Issues I
- 3 - Foreign Language Requirement³
- 4 - Natural Science Requirement⁴

15

Junior Year

First Semester

- 6 - Computer Science Requirement⁵
- 3 - Mathematical Sciences Requirement⁶
- 3 - Minor Requirement
- 3 - Natural Science Requirement⁴

15

Second Semester

- 3 - Computer Science Requirement⁵
- 6 - Minor Requirement
- 3 - Social Science Requirement³
- 3 - Writing Requirement⁷

15

Senior Year

First Semester

- 6 - Computer Science Requirement⁵
- 3 - Departmental Humanities Requirement⁸
- 3 - Minor Requirement
- 3 - Social Science Requirement³

15

Second Semester

- 3 - CP SC 491 Seminar in Professional Issues II
- 3 - Computer Science Requirement⁵
- 3 - Fine Arts Requirement⁹
- 3 - Minor Requirement
- 3 - Elective

15

121 Total Semester Hours

¹Select either the MTHSC 102/207 or 106/108 sequence. Students who select the 106/108 sequence will have satisfied the two elective credits in the freshman year. Students interested in computer graphics should select the 106/108 sequence.

²Four semesters (through 202) in the same modern foreign language are required.

³See General Education Requirements.

⁴Select from courses in BIOL, BIOCH, BIOSC, CH, GEOL, MICRO, PHYS; or EN SP 200. At least one course must include a laboratory and satisfy the Natural Science General Education Requirement.

⁵Select from CP SC courses numbered 300 or higher. No more than six credits of CP SC 481 may be applied to this requirement. Up to three credits of approved 300-level or higher MTHSC or E C E courses may be substituted.

⁶MTHSC 301, 302, or 311. MTHSC 311 is required for all graphics courses.

⁷Select from School-approved list.

⁸Select from courses in A A H, ANTH, ART, CHIN, DANCE, ENGL, FR, GER, HUM, ITAL, JAPN, MUSIC, P A, PHIL, REL, RUSS, SPAN, THEA.

⁹MUSIC 210 or any course in A A H, ART, or THEA.

Notes:

1. For graduation, a candidate for the BA degree in Computer Science must have earned a grade of C or better in each CP SC course applied to the degree.

2. A grade of C or better must be earned in all prerequisite courses (including CP SC and MTHSC courses) before enrolling in the next CP SC course.

GEOLOGY

Bachelor of Science

Geology and biogeochemical environmental science involve the physics and chemistry of materials that comprise the earth, as well as the development and influence of life on earth and the environmental systems and processes involved. The chemical, physical, and biological responses to environments on and in the earth must be thoroughly understood at a fundamental level so that the history of the earth can be deduced, future changes and natural disasters might be predicted, and sustainable approaches to natural resources developed. We depend on many geological resources; for example, water from ground and surface systems, metals from minerals, and power from coal, petroleum, and radioactive minerals. Geology integrates the science and engineering principles used for understanding and managing these geological and environmental systems. The Geology curriculum is built around three themes in geology and environmental science: appreciation for spatial and temporal scales, knowledge of earth materials and compositions of environmental systems, and understanding geological and environmental processes. The Bachelor of Science degree can be earned in traditional geology or with a concentration in Hydrogeology or Environmental Science. All majors participate in an interdisciplinary problem-oriented group research sequence and capstone course.

Employment opportunities for geologists and environmental scientists are numerous and varied. Included are such far-reaching fields as environmental and engineering consulting firms, mineral-producing industries, railroads, municipalities, natural resources conservation organizations, and water authorities. Many students go on to graduate study. It is important, therefore, that a geology or biogeochemical environmental science education develop a broad and rigorous base integrating a variety of descriptive and quantitative material.

The "traditional" curriculum provides the fundamentals of geology and excellent support in basic sciences. Graduates are prepared for employment or for graduate study in any field of geology. The Environmental Science Concentration provides an appropriate quantitative science base for students interested in environmental science and an introduction to environmental systems. It prepares students for careers in natural resources, the environmental consulting industry, government agencies or graduate school in environmental fields. The Hydrogeology Concentration may be taken by students interested in surface and groundwater systems and applying engineering principles to geologic problems. Graduates from the Hydrogeology Concentration work for consulting companies, government agencies and in the natural resources area or go on to graduate study.

Freshman Year

First Semester

- 4 - CH 101 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 3 - GEOL 101 Physical Geology
- 1 - GEOL 103 Physical Geology Lab.
- 4 - MTHSC 106 Calculus of One Variable I

15

Second Semester

- 4 - CH 102 General Chemistry
- 4 - GEOL 102 Earth History
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - Arts and Humanities (Non-Lit.) Requirement¹

15

Sophomore Year

First Semester

- 3 - BIOL 103 General Biology I
- 1 - BIOL 105 General Biology Lab. I
- 3 - GEOL 205 Mineralogy and Intro. Petrology
- 2 - GEOL 208 Min. and Intro. Petrography Lab.
- 4 - GEOL 211 Geoanalysis I²
- 1 - GEOL 291 Introduction to Research I
- 1 - Elective

15

Second Semester

- 4 - CSENV 202 Soils
- 4 - GEOL 212 Geoanalysis II²
- 1 - GEOL 292 Introduction to Research II
- 3 - PHYS 122 Physics with Calculus I
- 3 - Social Science Requirement¹

15

Junior Year

First Semester

- 3 - EN SP 200 Intro. to Environmental Science
- 4 - GEOL 302 Structural Geology
- 3 - GEOL 316 Igneous and Metamorphic Petrol.
- 2 - GEOL 391 Research Methods I
- 3 - Arts and Humanities (Literature) Requirement¹

15

Second Semester

- 3 - GEOL 300 Environmental Geology
- 4 - GEOL 313 Sedimentology and Stratigraphy
- 2 - GEOL 392 Research Methods II
- 3 - Geology Requirement¹
- 3 - Social Science Requirement¹
- 2 - Elective

17

Summer

- 6 - Summer Geology Field Course⁴

Senior Year

First Semester

- 4 - GEOL 405 Surficial Geology
- 3 - GEOL 408 Geohydrology
- 3 - GEOL 491 Research Synthesis I
- 2 - Elective

12

Second Semester

- 4 - GEOL 409 Subsurface Methods
- 3 - GEOL 492 Research Synthesis II
- 3 - Geology Requirement¹
- 2 - Elective

12

122 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

²MTHSC 206 and 208 or 301 or EX ST 301 may be substituted.

³Select from department-approved list.

⁴See advisor.

ENVIRONMENTAL SCIENCE CONCENTRATION

Freshman Year

First Semester

- 4 - CH 101 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 3 - GEOL 101 Physical Geology
- 1 - GEOL 103 Physical Geology Lab.
- 4 - MTHSC 106 Calculus of One Variable I

15

Second Semester

- 4 - CH 102 General Chemistry
- 4 - GEOL 102 Earth History
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - Arts and Humanities (Non-Lit.) Requirement¹

15

Sophomore Year

First Semester

- 3 - BIOL 103 General Biology I
- 1 - BIOL 105 General Biology Lab. I
- 3 - GEOL 205 Mineralogy and Intro. Petrology
- 1 - GEOL 207 Mineral. and Intro. Petrography Lab.
- 4 - GEOL 211 Geoanalysis I²
- 1 - GEOL 291 Introduction to Research I
- 3 - Arts and Humanities (Literature) Requirement¹

16

Second Semester

- 3 - BIOL 104 General Biology II
- 1 - BIOL 106 General Biology Lab. II
- 4 - GEOL 212 Geoanalysis II²
- 1 - GEOL 292 Introduction to Research II
- 3 - GEOL 300 Environmental Geology
- 3 - PHYS 122 Physics with Calculus I

15

Junior Year

First Semester

- 3 - EN SP 200 Intro. to Environmental Science
- 2 - GEOL 391 Research Methods I
- 9 - Environmental Science Requirement³
- 3 - Social Science Requirement¹

17

Second Semester

- 3 - GEOL 318 Introduction to Geochemistry
- 2 - GEOL 392 Research Methods II
- 9 - Environmental Science Requirement³
- 3 - Social Science Requirement¹

17

Summer

- 3 - Field Experience⁴

Senior Year**First Semester**

- 3 - EN SP 400 Studies in Environmental Science
- 3 - GEOL 408 Geohydrology
- 3 - GEOL 491 Research Synthesis I
- 3 - Environmental Science Requirement¹

12

Second Semester

- 3 - CH 223 Organic Chemistry or
3 - CH 413 Chemistry of Aqueous Systems
- 3 - GEOL 492 Research Synthesis II
- 6 - Environmental Science Requirement¹

12

122 Total Semester Hours

See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

MTHSC 206 and 208 or 301 or EX ST 301 may be substituted.

Select from department-approved list. At least three credit hours must be from geology courses.

¹Field course in geology, ecology, or related area. Must be at least three credits. Students desiring to become registered professional geologists should take a six-credit summer geology field course.

**HYDROGEOLOGY
CONCENTRATION****Freshman Year****First Semester**

- 4 - CH 101 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 3 - GEOL 101 Physical Geology
- 1 - GEOL 103 Physical Geology Lab.
- 4 - MTHSC 106 Calculus of One Variable I

15

Second Semester

- 4 - CH 102 General Chemistry
- 4 - GEOL 102 Earth History
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - Arts and Humanities (Non-Lit.) Requirement¹

15

Sophomore Year**First Semester**

- 3 - GEOL 205 Mineralogy and Intro. Petrology
- 1 - GEOL 207 Mineral. and Intro. Petrology Lab.
- 4 - GEOL 211 Geoanalysis I²
- 1 - GEOL 291 Introduction to Research I
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - Technical Requirement³

15

Second Semester

- 4 - GEOL 212 Geoanalysis II²
- 1 - GEOL 292 Introduction to Research II
- 3 - GEOL 300 Environmental Geology
- 3 - PHYS 122 Physics with Calculus I
- 1 - PHYS 124 Physics Lab. I
- 3 - Social Science Requirement¹

15

Junior Year**First Semester**

- 4 - GEOL 302 Structural Geology
- 2 - GEOL 391 Research Methods I
- 3 - GEOL 408 Geohydrology
- 3 - PHYS 221 Physics with Calculus II
- 3 - Geology Requirement⁴

15

Second Semester

- 4 - GEOL 313 Sedimentology and Stratigraphy
- 3 - GEOL 318 Introduction to Geochemistry
- 2 - GEOL 392 Research Methods II
- 3 - Social Science Requirement¹
- 3 - Technical Requirement³

15

Summer

- 6 - GEOL 475 Summer Geology Field Camp

Senior Year**First Semester**

- 3 - GEOL 421 GIS Applications in Geology
- 3 - GEOL 491 Research Synthesis I
- 3 - Geology Requirement⁴
- 3 - Technical Requirement³

12

Second Semester

- 3 - EE&S 401 Environmental Engineering
- 4 - GEOL 409 Subsurface Methods
- 3 - GEOL 492 Research Synthesis II
- 3 - Technical Requirement³

13

121 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

²MTHSC 206 and 208 or 301 or EX ST 301 may be substituted.

³Select from department-approved list.

⁴Any 300- or 400-level geology course

GEOLOGY**Bachelor of Arts****Freshman Year****First Semester**

- 4 - CH 101 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 3 - GEOL 101 Physical Geology
- 1 - GEOL 103 Physical Geology Lab.
- 3 - Mathematics Requirement¹

14

Second Semester

- 4 - CH 102 General Chemistry
- 3 - GEOG 103 World Regional Geography
- 4 - GEOL 102 Earth History
- 3 - Mathematics Requirement¹
- 2 - Elective

16

Sophomore Year**First Semester**

- 3 - BIOL 103 General Biology
- 1 - BIOL 105 General Biology Lab. I
- 3 - GEOL 205 Mineralogy and Intro. Petrology
- 1 - GEOL 207 Mineral. and Intro. Petrology Lab.
- 1 - GEOL 291 Introduction to Research I
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 4 - Foreign Language Requirement²

16

Second Semester

- 3 - BIOL 104 General Biology II
- 1 - BIOL 106 General Biology Lab. II
- 1 - GEOL 292 Introduction to Research II
- 3 - GEOL 300 Environmental Geology
- 4 - Foreign Language Requirement²
- 3 - Minor Requirement⁴

15

Junior Year**First Semester**

- 2 - GEOL 391 Research Methods I
- 3 - Foreign Language Requirement²
- 3 - Geology Requirement⁵
- 3 - Minor Requirement⁴
- 3 - Social Science Requirement¹
- 3 - Technical Requirement⁶

17

Second Semester

- 2 - GEOL 392 Research Methods II
- 3 - Foreign Language Requirement²
- 3 - Geology Requirement⁵
- 3 - Minor Requirement⁴
- 6 - Elective

17

Senior Year**First Semester**

- 3 - GEOL 491 Research Synthesis I
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - Minor Requirement⁴
- 3 - Elective

12

Second Semester

- 3 - GEOL 492 Research Synthesis II
- 3 - Minor Requirement⁴
- 3 - Technical Requirement⁶
- 6 - Elective

15

122 Total Semester Hours

¹MTHSC 106 and 108 are recommended, however, MTHSC 101 and 102 or MTHSC 102 and 203 may be substituted.

²See General Education Requirements

³Spanish is recommended. Two years (through 202) or the same foreign language are required

⁴See advisor

⁵Any 300- or 400-level geology course

⁶Select from department-approved list.

MATHEMATICAL SCIENCES

Bachelor of Science

The Mathematical Sciences curriculum is designed to be versatile. Students gain a broad knowledge of mathematical concepts and methods that are applicable in sciences, engineering, business, industry, and other professions requiring a strong mathematical background. In addition to the basic courses which provide necessary mathematical skills, the curriculum allows students to select an emphasis area or concentration, providing an introduction to a specific area where mathematics is used. These are Abstract Mathematics, Actuarial Science/Financial Mathematics, Applied and Computational Mathematics, Biology, Computer Science, Operations Research/Management Science, and Statistics.

In addition to the overall goal of preparing students to cope with a variety of mathematical problems, the curriculum seeks to provide an adequate background for students who plan to pursue graduate study or positions in business, industry, or government. Students electing the Biology Concentration will have the necessary preparation for entering medical school. More information about the degree program can be found at www.math.clemson.edu.

All mathematical sciences majors are required to complete a capstone experience which provides an opportunity to pursue research, independent study, or an approved internship under the direction of a faculty member, or the opportunity to study mathematical models in some area of the mathematical sciences. The capstone experience requires a written report (thesis, computer code, project description, intern experience, etc.) and an oral or poster presentation by each student.

Combined Bachelor's/Master's Plan

Under this plan, students may reduce the time necessary to earn both degrees by applying graduate credits to both undergraduate and graduate program requirements. Students are encouraged to obtain the specific requirements for pursuing the dual degree from the Department of Mathematical Sciences (www.math.clemson.edu) as early as possible in their undergraduate program. Enrollment guidelines and procedures can be found under *Academic Regulations* in this catalog.

Freshman Year

First Semester

- 3 - ECON 211 Principles of Microeconomics
 - 3 - ENGL 103 Accelerated Composition
 - 4 - MTHSC 106 Calculus of One Variable I
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
 - 3 - Foreign Language Requirement²
- 16

Second Semester

- 4 - MTHSC 108 Calculus of One Variable II
 - 3 - MTHSC 129 Prob. Solving in Discrete Math.
 - 3 - PHYS 122 Physics with Calculus I
 - 3 - Computer Science Requirement³
 - 3 - Social Science Requirement¹
- 16

Sophomore Year

First Semester

- 4 - MTHSC 206 Calculus of Several Variables
 - 1 - MTHSC 250 Intro. to Mathematical Sciences
 - 3 - MTHSC 311 Linear Algebra
 - 3 - MTHSC 360 Intermediate Math. Computing
 - 4 - Natural Science Requirement⁴
- 15

Second Semester

- 4 - MTHSC 208 Intro. to Ordinary Diff. Equations
 - 3 - MTHSC 302 Statistics for Science and Engr.
 - 3 - Arts and Humanities (Literature) Requirement¹
 - 4 - Natural Science Requirement⁴
 - 3 - Elective
- 17

Junior Year

First Semester

- 3 - ENGL 314 Technical Writing
 - 3 - MTHSC 400 Theory of Probability
 - 3 - MTHSC 440 Linear Programming
 - 3 - MTHSC 453 Advanced Calculus I
 - 3 - Science Requirement⁵
- 15

Second Semester

- 3 - MTHSC 412 Introduction to Modern Algebra
 - 3 - MTHSC 454 Advanced Calculus II
 - 3 - Emphasis Area Requirement⁶
 - 3 - Science Requirement⁵
 - 3 - Elective
- 15

Senior Year

First Semester

- 3 - COMM 250 Public Speaking
 - 3 - Capstone Experience⁷
 - 6 - Emphasis Area Requirement⁶
 - 3 - Science and Tech. in Society Requirement¹
- 15

Second Semester

- 1 - MTHSC 492 Professional Development
 - 3 - Capstone Experience⁷
 - 3 - Emphasis Area Requirement⁶
 - 3 - Mathematical Sciences Requirement⁸
 - 3 - Elective
- 13

122 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

²Three credits in any foreign language, including American Sign Language, numbered 102 or above

³CP SC 101, 111, or 120

⁴A two-semester sequence selected from BIOL 103/105 and 104/106; CH 101 and 102; PHYS 221/223 and 222/224; GEOL 101/103 and 102

⁵ECON 314 and 405; CP SC 102 and 212; CP SC 210 and 212; or any two natural science courses from General Education Natural Science Requirements (labs not required). Actuarial Science/Financial Mathematics and Operations Research Emphasis Areas require ECON 314 and 405. Computer Science Emphasis Area requires CP SC 102 and 212, or 210 and 212.

⁶Select from Abstract Mathematics, Actuarial Science/Financial Mathematics, Applied and Computational Mathematics, Computer Science, Operations Research/Management Science, or Statistics.

⁷May be satisfied by (1) completion of six credits of MTHSC 482 or H482; (2) completion of six credits of MTHSC 491 or an approved substitution; or (3) completion of three credits of MTHSC 450 and three credits of an additional course approved by the advisor. Students in Actuarial Science/Financial Mathematics Emphasis Area must take MTHSC 441 and FIN 405.

⁸Any 400-level MTHSC course approved by advisor

Notes:

1. For graduation, a candidate for the BS degree in Mathematical Sciences will be required to have a 2.0 or higher cumulative grade-point ratio in all required MTHSC courses.

2. A grade of C or better must be earned in all prerequisite courses before enrolling in the next MTHSC course.

EMPHASIS AREAS

Abstract Mathematics¹

- 6 - Abstract Mathematics Requirement²
 - 6 - Mathematical Sciences Requirement³
- 12

Actuarial Science/Financial Mathematics⁴

- 3 - FIN 312 Financial Management II
 - 3 - MTHSC 403 Intro. to Statistical Theory
 - 3 - MTHSC 407 Regress. and Time-Ser. Analysis
 - 3 - MTHSC 431 Theory of Interest
- 12

Applied and Computational Mathematics

- 3 - MTHSC 434 Advanced Engineering Math.
 - 3 - MTHSC 460 Intro. to Numerical Analysis I
 - 6 - Applications Area¹
- 12

Computer Science

- 3 - CP SC 215 Software Development Foundations
 - 9 - Computer Science 300-Level Requirement⁵
- 12

Operations Research/Management Science

- 3 - I E 384 Engineering Economic Analysis or
 - 4 - I E 482 Systems Modeling
 - 3 - MGT 402 Operations Planning and Control
 - 3 - MTHSC 407 Regress. and Time-Ser. Analysis
 - 3 - MTHSC 441 Intro. to Stochastic Models
- 12-13

Statistics

- 3 - MTHSC 403 Intro. to Statistical Theory
 - 3 - MTHSC 405 Statistical Theory and Meth. II
 - 3 - MTHSC 406 Sampling Theory and Methods
 - 3 - MTHSC 407 Regress. and Time-Ser. Analysis
- 12

¹See advisor.

²MTHSC 408, 410, 419, or 435

³Any 400-level MTHSC course

⁴See advisor. Students are advised to take ACCT 204, ECON 212, FIN 311, MTHSC 430, 432 as electives and FIN 405, MTHSC 441 as capstone experience.

⁵Any 300-400-level CP SC course

BIOLOGY CONCENTRATION

Freshman Year

First Semester

- 5 - BIOL 110 Principles of Biology I
 - 3 - ENGL 103 Accelerated Composition
 - 4 - MTHSC 106 Calculus of One Variable I
 - 3 - Foreign Language Requirement¹
- 15

Second Semester

- 5 - BIOL 111 Principles of Biology II
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - MTHSC 129 Prob. Solving in Discrete Math.
- 3 - Computer Science Requirement²

15

Sophomore Year**First Semester**

- 4 - CH 101 General Chemistry
- 3 - ECON 200 Economic Concepts or
- 3 - ECON 211 Principles of Microeconomics
- 4 - MTHSC 206 Calculus of Several Variables
- 1 - MTHSC 250 Intro. to Mathematical Sciences
- 3 - PHYS 207 General Physics I
- 1 - PHYS 209 General Physics I Lab.

16

Second Semester

- 4 - CH 102 General Chemistry
- 4 - MTHSC 208 Intro. to Ordinary Diff. Equations
- 3 - MTHSC 311 Linear Algebra
- 3 - PHYS 208 General Physics II
- 1 - PHYS 210 General Physics II Lab.

15

Junior Year**First Semester**

- 3 - CH 223 Organic Chemistry
- 1 - CH 227 Organic Chemistry Lab.
- 3 - ENGL 314 Technical Writing
- 3 - MTHSC 360 Intermediate Math. Computing
- 3 - MTHSC 440 Linear Programming
- 3 - Arts and Humanities (Literature) Requirement³

16

Second Semester

- 3 - CH 224 Organic Chemistry
- 1 - CH 228 Organic Chemistry Lab.
- 3 - COMM 250 Public Speaking
- 3 - MTHSC 302 Statistics for Science and Engr.
- 3 - Arts and Humanities (Non-Lit.) Requirement³
- 3 - Math Science Requirement⁴

16

Senior Year**First Semester**

- 3 - MTHSC 400 Theory of Probability
- 3 - MTHSC 453 Advanced Calculus I or
- 3 - MTHSC 463 Mathematical Analysis I
- 3 - Animal or Plant Diversity Requirement⁵
- 3 - Capstone Experience⁶
- 3 - Social Science Requirement³

15

Second Semester

- 3 - MTHSC 412 Introduction to Modern Algebra
- 3 - MTHSC 454 Advanced Calculus II
- 1 - MTHSC 492 Professional Development
- 3 - Biological Sciences Requirement⁷
- 3 - Capstone Experience⁶

13

121 Total Semester Hours

¹Three credits in any foreign language, including American Sign Language, numbered 102 or above

²CPSC 101, 111, or 120

³See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

⁴Any 400-level MTHSC course approved by advisor

⁵BIOSC 302, 303, 304, or 305

⁶May be satisfied by (1) completion of six credits of MTHSC 482 or H482; (2) completion of six credits of MTHSC 491 or an approved substitution; or (3) completion of three credits of MTHSC 450 and three credits of an additional course approved by advisor.

⁷BIOSCI 301, GEN 302/303, MICRO 305, or any 300-400-level BIOSC course

Notes:

1. For graduation, a candidate for the BS degree in Mathematical Sciences will be required to have a 2.0 or higher cumulative grade-point ratio in all required MTHSC courses.

2. A grade of C or better must be earned in all prerequisite courses before enrolling in the next MTHSC course.

MATHEMATICAL SCIENCES**Bachelor of Arts****Freshman Year****First Semester**

- 3 - ECON 200 Economic Concepts or
- 3 - ECON 211 Principles of Microeconomics
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - Foreign Language Requirement¹
- 1 - Elective

14

Second Semester

- 4 - MTHSC 108 Calculus of One Variable II
- 3 - MTHSC 129 Prob. Solving in Discrete Math.
- 3 - Computer Science Requirement²
- 3 - Foreign Language Requirement¹
- 3 - Social Science Requirement³

16

Sophomore Year**First Semester**

- 4 - MTHSC 206 Calculus of Several Variables
- 1 - MTHSC 250 Intro. to Mathematical Sciences
- 3 - MTHSC 360 Intermed. Math. Computing or
- 3 - EDSEC 437 Technology in Sec. Math.⁵
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - Elective

14

Second Semester

- 4 - MTHSC 208 Intro. to Ordinary Diff. Equations
- 3 - MTHSC 302 Statistics for Science and Engr.
- 3 - MTHSC 311 Linear Algebra
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 3 - Minor Requirement⁴ or
- 3 - Second Major Requirement

16

Junior Year**First Semester**

- 3 - ENGL 314 Technical Writing
- 3 - MTHSC 412 Introduction to Modern Algebra
- 3 - Math Science Requirement⁵
- 4 - Natural Science Requirement³
- 3 - Elective

16

Second Semester

- 3 - COMM 250 Public Speaking
- 3 - Math Science Requirement¹
- 3 - Minor Requirement⁴ or
- 3 - Second Major Requirement
- 4 - Natural Science Requirement¹
- 3 - Elective

16

Senior Year**First Semester**

- 3 - MTHSC 453 Advanced Calculus I
- 3 - Arts and Humanities Requirement¹ or
- 3 - Education Requirement⁷
- 3 - Capstone Experience¹
- 3 - Minor Requirement⁴ or
- 3 - Second Major Requirement
- 3 - Science and Tech. in Society Requirement¹

15

Second Semester

- 1 - MTHSC 492 Professional Development
- 3 - Capstone Experience⁷
- 3 - Math Science Requirement⁵
- 6 - Minor Requirement⁴ or
- 6 - Second Major Requirement
- 2 - Elective

15

122 Total Semester Hours

¹Six credits in any foreign language, including American Sign Language, numbered 200 or above

²CPSC 101, 111, or 120

³See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

⁴See page 106 for approved minors

⁵MTHSC 308 or any 400-level MTHSC course

⁶See advisor

⁷May be satisfied by (1) completion of six credits of MTHSC 482 or H482; (2) completion of six credits of MTHSC 491 or an approved substitution; (3) completion of three credits of MTHSC 450 and three credits of an additional course approved by advisor; or (4) EDSEC 446 for students seeking a double major in Secondary Education-Mathematics

Notes:

1. For graduation, a candidate for the BA degree in Mathematical Sciences will be required to have a 2.0 or higher cumulative grade-point ratio in all required MTHSC courses

2. A grade of C or better must be earned in all prerequisite courses before enrolling in the next MTHSC course

PHYSICS**Bachelor of Science**

Physics, the most fundamental of the natural sciences, forms the basis of study upon which the other branches of science are founded. Physics is concerned with the fundamental behavior of matter and energy. Classical physics encompasses the fields of mechanics, heat and thermodynamics, electricity and magnetism, acoustics and optics. Modern physics is concerned with the study of atoms and molecules, atomic nuclei, elementary particles and the properties of liquids, crystalline solids, and other materials, as well as the areas of relativity, cosmology, and the large-scale structure of the universe

The undergraduate Physics curricula provide students with a strong background in the classical areas of physics, as well as an introduction to the more important aspects of modern physics. The BS curriculum is directed toward preparing students for graduate study ultimately leading to the PhD degree or toward research and development work in industrial or governmental laboratories. It also provides a good background for graduate study or industrial work in many areas of engineering physics and applied science.

Freshman Year

First Semester

- 3 - ASTR 105 Physics of the Universe
 - 4 - CH 101 General Chemistry
 - 3 - ENGL 103 Accelerated Composition
 - 4 - MTHSC 106 Calculus of One Variable I
 - 1 - PHYS 101 Current Topics in Modern Physics
-
- 15

Second Semester

- 4 - CH 102 General Chemistry
 - 4 - MTHSC 108 Calculus of One Variable II
 - 3 - PHYS 122 Physics with Calculus I
 - 1 - PHYS 124 Physics Lab. I
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
-
- 15

Sophomore Year

First Semester

- 4 - MTHSC 206 Calculus of Several Variables
 - 3 - PHYS 221 Physics with Calculus II
 - 3 - PHYS 223 Physics Lab. II
 - 4 - Foreign Language Requirement²
 - 3 - Oral Communication Requirement¹
-
- 15

Second Semester

- 4 - MTHSC 208 Intro. to Ordinary Diff. Equations
 - 3 - PHYS 222 Physics with Calculus III
 - 1 - PHYS 224 Physics Lab. III
 - 4 - Foreign Language Requirement²
 - 3 - Social Science Requirement¹
-
- 15

Junior Year

First Semester

- 3 - PHYS 311 Intro. to Meth. of Theoretical Phys.
 - 3 - PHYS 321 Mechanics I
 - 3 - PHYS 325 Experimental Physics I
 - 3 - Emphasis Area Requirement³
 - 3 - Physics Writing Requirement⁴
-
- 15

Second Semester

- 1 - PHYS 300 Introduction to Research
 - 3 - PHYS 312 Methods of Theoretical Physics II
 - 3 - PHYS 322 Mechanics II
 - 3 - PHYS 326 Experimental Physics II
 - 1 - PHYS 356 Modern Physics Overview
 - 3 - PHYS 441 Electromagnetics I
 - 3 - Emphasis Area Requirement³
-
- 17

Senior Year

First Semester

- 3 - PHYS 401 Senior Thesis
 - 3 - PHYS 442 Electromagnetics II
 - 3 - PHYS 455 Quantum Physics I
 - 3 - Emphasis Area Requirement³
 - 3 - Science Requirement⁵
-
- 15

Second Semester

- 3 - HIST 172 The West and the World I or
3 - HIST 173 The West and the World II
 - 3 - PHYS 456 Quantum Physics II
 - 3 - PHYS 465 Thermodynamics and Statistical Mechanics
 - 3 - Arts and Humanities (Literature) Requirement⁶
 - 3 - Emphasis Area Requirement³
-
- 15

122 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

²Two semesters (through 102) in the same modern foreign language are required.

³See advisor. Select from the following emphasis areas: Chemistry, Computer Science, Engineering, Environmental Engineering, Geology, Mathematical Sciences, or Physics and Astronomy. Twelve credit hours in one of these areas, with at least six at the 300-400 level, are required. Note: Requirements for a minor in one of these areas might be satisfied with three additional credits at the 300-400 level.

⁴ENGL 304, 312, 314, 315, 316, 345, 346, 348, M L 402, or THEA (ENGL) 347

⁵Any 200-400-level science course

⁶Select any ENGL course from General Education Arts and Humanities (Literature) Requirement.

BIOPHYSICS CONCENTRATION

The Biophysics Concentration offers an excellent preparation for medical school or graduate work in biological sciences. It includes the flexibility of selecting courses in chemistry, biological sciences, physics, and mathematics. This concentration also provides the necessary background for employment in industry, manufacturing, and instrumentation for clinical or molecular biology applications.

Freshman Year

First Semester

- 3 - ASTR 105 Physics of the Universe
 - 4 - CH 101 General Chemistry
 - 3 - ENGL 103 Accelerated Composition
 - 4 - MTHSC 106 Calculus of One Variable I
 - 1 - PHYS 101 Current Topics in Modern Physics
-
- 15

Second Semester

- 4 - CH 102 General Chemistry
 - 4 - MTHSC 108 Calculus of One Variable II
 - 3 - PHYS 122 Physics with Calculus I
 - 1 - PHYS 124 Physics Lab. I
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
-
- 15

Sophomore Year

First Semester

- 5 - BIOL 110 Principles of Biology
 - 4 - MTHSC 206 Calculus of Several Variables
 - 3 - PHYS 221 Physics with Calculus II
 - 1 - PHYS 223 Physics Lab. II
 - 3 - Oral Communication Requirement¹
-
- 16

Second Semester

- 4 - MTHSC 208 Intro. to Ordinary Diff. Equations
 - 3 - PHYS 222 Physics with Calculus III
 - 1 - PHYS 224 Physics Lab. III
 - 4 - Biophysics Requirement²
 - 3 - Social Science Requirement¹
-
- 15

Junior Year

First Semester

- 3 - PHYS 311 Intro. to Meth. of Theoretical Phys.
 - 3 - PHYS 321 Mechanics I
 - 3 - PHYS 325 Experimental Physics I
 - 3 - Biophysics Requirement²
 - 4 - Foreign Language Requirement³
-
- 16

Second Semester

- 1 - PHYS 300 Introduction to Research
 - 3 - PHYS 312 Methods of Theoretical Physics II
 - 3 - PHYS 322 Mechanics II
 - 1 - PHYS 356 Modern Physics Overview
 - 3 - PHYS 441 Electromagnetics I
 - 3 - Biophysics Requirement²
 - 4 - Foreign Language Requirement³
-
- 18

Senior Year

First Semester

- 3 - PHYS 442 Electromagnetics II
 - 3 - PHYS 455 Quantum Physics I
 - 3 - Biophysics Requirement²
 - 3 - Physics Writing Requirement⁴
 - 3 - Science Requirement⁵
-
- 15

Second Semester

- 3 - HIST 172 The West and the World I or
3 - HIST 173 The West and the World II
 - 3 - PHYS 456 Quantum Physics II
 - 3 - PHYS 465 Thermodynamics and Statistical Mechanics⁶
 - 3 - Arts and Humanities (Literature) Requirement⁷
 - 3 - Biophysics Requirement²
-
- 15

125 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

²Select from department-approved list of courses in biological sciences, chemistry, mathematical sciences, and physics. At least six credit hours must be in biological sciences.

³Two semesters (through 102) in same modern foreign language are required.

⁴ENGL 304, 312, 314, 315, 316, 345, 346, 348, M L 402, or THEA (ENGL) 347

⁵Any 200-400-level science course

⁶An approved physics course may be substituted if CH 331 and 332 have been completed.

⁷Select any ENGL course from General Education Arts and Humanities (Literature) Requirement.

PHYSICS

Bachelor of Arts

The Bachelor of Arts in Physics program is ideal for students interested in acquiring a broad-based liberal education that includes a strong and solid understanding of either science or a broad exposure to engineering with a strong physics foundation.

Freshman Year

First Semester

- 3 - ASTR 105 Physics of the Universe
 - 4 - CH 101 General Chemistry
 - 3 - ENGL 103 Accelerated Composition
 - 4 - MTHSC 106 Calculus of One Variable I
 - 1 - PHYS 101 Current Topics in Modern Physics
- 15

Second Semester

- 4 - CH 102 General Chemistry
 - 4 - MTHSC 108 Calculus of One Variable II
 - 3 - PHYS 122 Physics with Calculus I
 - 1 - PHYS 124 Physics Lab. I
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 15

Sophomore Year

First Semester

- 4 - MTHSC 206 Calculus of Several Variables
 - 3 - PHYS 221 Physics with Calculus II
 - 1 - PHYS 223 Physics Lab. II
 - 4 - Foreign Language Requirement²
 - 3 - Oral Communication Requirement¹
- 15

Second Semester

- 4 - MTHSC 208 Intro. to Ordinary Diff. Equations
 - 3 - PHYS 222 Physics with Calculus III
 - 1 - PHYS 224 Physics Lab. III
 - 4 - Foreign Language Requirement²
 - 3 - Social Science Requirement¹
- 15

Junior Year

First Semester

- 3 - PHYS 311 Intro. to Meth. of Theoretical Phys.
 - 3 - PHYS 321 Mechanics I
 - 3 - PHYS 325 Experimental Physics I
 - 3 - Foreign Language Requirement²
 - 3 - Minor Requirement¹
- 15

Second Semester

- 1 - PHYS 300 Introduction to Research
 - 3 - PHYS 312 Methods of Theoretical Physics II
 - 3 - PHYS 322 Mechanics II
 - 1 - PHYS 356 Modern Physics Overview
 - 3 - PHYS 441 Electromagnetics I
 - 3 - Foreign Language Requirement²
 - 3 - Minor Requirement¹
- 17

Senior Year

First Semester

- 3 - PHYS 455 Quantum Physics I
 - 6 - Minor Requirement³
 - 3 - Physics Writing Requirement⁴
 - 3 - Physics Requirement⁵
- 15

Second Semester

- 3 - HIST 172 The West and the World I or
 - 3 - HIST 173 The West and the World II
 - 3 - Arts and Humanities (Literature) Requirement⁶
 - 3 - Minor Requirement¹
 - 3 - Physics Requirement¹
 - 3 - Elective
- 15

122 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

²Four semesters (through 202) in the same modern foreign language are required.

³See advisor.

⁴ENGL 304, 312, 314, 315, 316, 345, 346, 348, M.L. 402, or THEA (ENGL) 347.

⁵Any 300- or 400-level physics course

⁶Select any ENGL course from General Education Arts and Humanities (Literature) Requirement.

POLYMER AND FIBER CHEMISTRY

Bachelor of Science

The School of Materials Science and Engineering offers undergraduate degrees in Ceramic and Materials Engineering and Polymer and Fiber Chemistry.

The Bachelor of Science degree in Polymer and Fiber Chemistry is based on a foundation in physical and mathematical sciences. From this base, students are taught, using classroom instruction, laboratory courses, and individual research, to apply their scientific knowledge to the solution of problems in polymeric and fiber-based materials for diverse applications ranging from biomedical and sports to construction and communication. The degree in Polymer and Fiber Chemistry also prepares students for graduate studies in a number of science and engineering disciplines.

Graduates in Polymer and Fiber Chemistry hold jobs in corporate and personnel management, manufacturing management, design, research, development, technical service, quality control, and sales. They create new products and processes and solve problems. They create styles, patterns, textures, and colors for apparel, home, industry, and special applications. Their jobs utilize computers, automation, and product quality and are concerned with plant design, environmental control, and consumer safety.

Freshman Year

First Semester

- 4 - CH 101 General Chemistry
 - 3 - ENGL 103 Accelerated Composition
 - 4 - MTHSC 106 Calculus of One Variable I
 - 3 - TEXT 175 Intro. to Textile Manufacturing
 - 3 - History Requirement¹
- 17

Second Semester

- 4 - CH 102 General Chemistry
 - 4 - MTHSC 108 Calculus of One Variable II
 - 3 - PHYS 122 Physics with Calculus I
 - 3 - Arts and Humanities (Non-Lit.) Requirement²
- 14

Sophomore Year

First Semester

- 3 - CH 223 Organic Chemistry
 - 1 - CH 227 Organic Chemistry Lab.
 - 4 - MTHSC 206 Calculus of Several Variables
 - 3 - PHYS 221 Physics with Calculus II
 - 1 - PHYS 223 Physics Lab. II
 - 3 - Arts and Humanities (Literature) Requirement¹
- 15

Second Semester

- 3 - CH 224 Organic Chemistry
 - 1 - CH 228 Organic Chemistry Lab.
 - 3 - ECON 200 Economics Concepts
 - 3 - EN SP 200 Intro. to Environmental Science or
 - 3 - HIST 122 History, Tech., and Science or
 - 3 - HIST 124 Environmental History Survey
 - 1 - MS&E 251 Materials Science Portfolio I
 - 4 - MTHSC 208 Intro. to Ordinary Diff. Equations
- 15

Junior Year

First Semester

- 3 - CH 331 Physical Chemistry
 - 3 - PFC 415 Intro. to Polymer Science and Engr.
 - 1 - PFC 417 Polymer and Fiber Lab.
 - 4 - TEXT 201 Yarn Structures and Formation
 - 3 - Technical Writing Requirement⁴
- 14

Second Semester

- 3 - CH 332 Physical Chemistry
 - 3 - COMM 250 Public Speaking
 - 3 - MS&E 324 Statistics for MS&E
 - 3 - PFC 416 Chemical Preparation of Textiles
 - 4 - TEXT 202 Fabric Struct., Des., and Analysis
- 16

Senior Year

First Semester

- 3 - PFC 457 Dyeing and Finishing I
 - 1 - PFC 459 Dyeing and Finishing I Lab.
 - 3 - TEXT 421 Fiber Science
 - 5 - Approved Requirement⁴
 - 3 - Departmental Requirement⁴
- 15

Second Semester

- 1 - MS&E 451 MS&E Portfolio II
 - 3 - MS&E 491 Undergraduate Research
 - 3 - PFC 458 Dyeing and Finishing II
 - 1 - PFC 460 Dyeing and Finishing II Lab.
 - 3 - TEXT 422 Properties of Textile Structures
 - 3 - Departmental Requirement⁴
- 14

120 Total Semester Hours

¹HIST 172 or 173

²See General Education Requirements.

³Select any 200-level ENGL course from General Education Arts and Humanities (Literature) Requirement

⁴See advisor.

MINORS

Following are minors acceptable for students in the College of Engineering and Science. Students cannot major and minor in the same field or acquire a minor that is not allowed by the degree program.

Accounting	Management Information Systems
Adult/Extension Education	Mathematical Sciences
Aerospace Studies	Microbiology
Agricultural Business Management	Military Leadership
Agricultural Mechanization and Business	Modern Languages
American Sign Language Studies	Music
Animal and Veterinary Sciences	Natural Resource Economics
Anthropology	Nonprofit Leadership
Architecture	Packaging Science
Athletic Leadership	Pan African Studies
Biochemistry	Park and Protected Area Management
Biological Sciences	Philosophy
Business Administration	Physics
Chemistry	Plant Pathology
Cluster	Political Science
Communication Studies	Psychology
Computer Science—not open to Computer Information Systems majors	Public Policy
Crop and Soil Environmental Science	Religion
East Asian Studies	Russian Area Studies
Economics	Science and Technology in Society
Education	Screenwriting
English	Sociology
Entomology	Spanish-American Area Studies
Entrepreneurship	Theatre
Environmental Engineering	Therapeutic Recreation
Environmental Science and Policy	Travel and Tourism
Equine Business	Turfgrass
Film Studies	Urban Forestry
Financial Management	Wildlife and Fisheries Biology
Food Science	Women's Studies
Forest Products	Writing
Forest Resource Management	
Genetics	
Geography	
Geology	
Global Politics	
Great Works	
History	
Horticulture	
International Engineering and Science	
Legal Studies	
Management	

See pages 36–39 for details.

COLLEGE OF HEALTH, EDUCATION AND HUMAN DEVELOPMENT

The College of Health, Education and Human Development provides students the means by which to pursue careers in the fields of nursing, education, health, and recreation management. The "Engaged College with a Personal Touch" is home to the academic programs offered by the School of Nursing; the Eugene T. Moore School of Education; the Department of Public Health Sciences; and the Department of Parks, Recreation and Tourism Management. The College also offers outreach services available through the Joseph E. Sullivan Center; the National Dropout Prevention Center; and the Outdoor Laboratory. Collaboration within the college between academics and community outreach services prepares students to be professional leaders in health, education, and recreation management. As with all programs at the University, students take course offerings from all colleges on campus to achieve the most complete education possible.

ATHLETIC LEADERSHIP CERTIFICATE

Students acquiring the nationally recognized American Sport Education Program (ASEP) Certification through the Athletic Leadership Program at Clemson are eligible to complete the requirements for Athletic Leadership Certification in any of the following areas related to their ASEP Certification: (1) Sport Coaching and Character Development; (2) Sport First Aid and Conditioning; and (3) Sport Psychology and Motivation. For more information, contact the Coordinator of Athletic Leadership at (864) 656-0434.

EUGENE T. MOORE SCHOOL OF EDUCATION

The mission of the Eugene T. Moore School of Education is to prepare caring and capable professionals through intellectually engaging experiences in theory, method, and research that connect them to the communities in which they live and serve. The Eugene T. Moore School of Education trains teachers, counselors, university administrators, and leaders for the P-12 schools and training and development specialists for business and industry.

TEACHER EDUCATION PROGRAMS

The Eugene T. Moore School of Education Conceptual Framework guides the School's work as a unit. It is consensus-based and provides the foundation for all that is done. It addresses the fundamental issues of what students need to know (knowledge), what they need to be able to do (skills), what they value (dispositions), and how they interface with their communities, large and small (connections). The Conceptual Framework, simply stated, is to prepare caring, capable, and connected professionals for the twenty-first century.

The Teacher Education Programs prepare teachers, provide professional services to education in South Carolina, and carry out basic and applied research in education. Curricula provide a broad general education through liberal arts and science courses, develop depth of knowledge in the teaching area, gain an understanding of the historical, philosophical, and psychological backgrounds of American education, and acquire knowledge of and skill and experience in effective teaching techniques.

The Teacher Education Programs are accredited by the National Council for the Accreditation of Teacher Education (NCATE) for the preparation of educational personnel in South Carolina in Early Childhood, Elementary, Special Education, and secondary school programs in Agriculture, Biological Sciences, English, Mathematics, Physical Sciences, and Social Sciences (Economics, History, Political Science, Psychology, and Sociology).

Criminal Records Check

A criminal record could prevent a person enrolled in a teacher education program in South Carolina from being certified as a teacher in this state in accordance with State Board of Education guidelines.

Section 59-25-115 of the South Carolina Code of Laws specifies that before beginning the full-time clinical teaching experience in South Carolina, a teacher education candidate shall undergo a state criminal records check by the South Carolina Law Enforcement Division (SLED) and a national criminal records check supported by fingerprints by the Federal Bureau of Investigation (FBI). The applicant is responsible for the cost associated with the FBI background checks. Information reported relative to prior arrests or convictions will be reviewed by the State Department of Education, and the State Board of Education when warranted, according to board guidelines. A teacher education candidate with prior arrests or convictions of a serious nature that could affect his/her fitness to teach in the public schools of South Carolina may be denied the opportunity to complete the clinical teaching experience, and thus affect eligibility for initial teacher certification. An individual who is denied this opportunity as a result of prior arrests or convictions, after one year, may request reconsideration under guidelines established by the State Board of Education.

The criminal records check will be handled through the Office of Teacher Certification at the South Carolina State Department of Education and will be considered phase one of a person's application for a teaching credential. Provided the criminal records check is conducted within 18 months of the time the teacher candidate formally applies for a teaching certificate, the fingerprinting will not have to be repeated at the time of application. A graduate of a teacher education program applying for initial teacher certification must have completed the FBI fingerprint process within 18 months of formally applying for initial teacher certification or the fingerprint process must be repeated. The background check normally requires six (6) to eight (8) weeks to process. If the fingerprint card cannot be processed, the South Carolina State Department will inform the individual that it will be necessary to complete another fingerprint card and submit it to their office as soon as possible.

Admission

Professional—Application to the professional level of a program will be processed during the term in which a student is to complete 45 semester hours of work. At that time, the student will be notified of his/her status by the College's Academic Advising Center. Prior to admission, the student must have passed all areas of the Praxis I Pre-Professional Skills Test (PPST) and have a minimum cumulative grade-point ratio of 2.5. A student may exempt the PPST by meeting minimum ACT or SAT requirements as determined each year by the South Carolina Department of Education.

Directed Teaching/Teaching Internship (Secondary)—A student shall apply to the field experience director prior to the semester in which block methods courses are to be scheduled. The following conditions must be met prior to registration for directed teaching: (1) admission to the professional level of a program; (2) completion of at least 95 semester hours; (3) a minimum cumulative grade-point ratio of 2.5. Students with a grade-point ratio of 2.25 to 2.5 may appeal to the Director of the School of Education, but exceptions are not common.

Enrollment in Professional Courses

Enrollment in 400-level professional education courses is contingent upon admission to the professional level as described above. Any student who desires to enroll in education courses must meet the cumulative grade-point requirements established for education majors. Appeals to continue taking classes may be made to the Chair of Teacher Education, but exceptions are not common.

Change of Major

Changing majors into Education is highly competitive and limited in Early Childhood Education and somewhat competitive and limited in Elementary Education, Secondary Education-Social Studies, and Secondary Education-English. The process involves a formal application and an essay. Requests for a change of major application can be made at the Health, Education and Human Development Academic Advising Center in 309 Edwards Hall and should be accompanied by an appointment with an advisor.

Graduation

To graduate, a student must have scores for all state-mandated certification exams on file with the Academic Advising Center in the College of Health, Education and Human Development. As of July 2006, students must pass all required Praxis II tests, including PLT (Principles of Learning and Teaching), before becoming program completers and receiving recommendation for certification.

Graduate Study

Clemson University offers programs leading to the Master of Arts in Teaching, Master of Education, Master of Human Resource Development, Specialist in Education, and Doctor of Philosophy degrees.

AGRICULTURAL EDUCATION

Bachelor of Science

The College of Health, Education and Human Development and the College of Agriculture, Forestry and Life Sciences conduct a cooperative program to produce agricultural teachers (grades 9–12) for South Carolina. See page 40 for the curriculum.

EARLY CHILDHOOD EDUCATION

Bachelor of Arts

The Early Childhood Education curriculum prepares students for teaching positions on the pre-kindergarten and primary levels (Pre-K–3).

Freshman Year

First Semester

- 2 - ED 105 Orientation to Education
- 3 - HIST 173 The West and the World II
- 3 - MTHSC 101 Essential Math. for Informed Soc.
- 3 - Foreign Language Requirement¹
- 4 - Natural Science Requirement²
- 1 - Elective

16

Second Semester

- 3 - A A H 210 Intro. to Art and Architecture
- 3 - COMM 150 Intro. to Human Comm. or
3 - COMM 250 Public Speaking
- 3 - ENGL 103 Accelerated Composition
- 3 - MTHSC 117 Mathematics for Elementary School Teachers I
- 3 - Foreign Language Requirement¹

15

Sophomore Year

First Semester

- 3 - ED EC 220 Family, School, and Community Relationships
- 3 - GEOG 103 World Regional Geography
- 3 - MTHSC 118 Mathematics for Elementary School Teachers II
- 3 - Arts and Humanities (Literature) Requirement³
- 4 - Natural Science Requirement²

16

Second Semester

- 3 - ED F 302 Educational Psychology
- 1 - ED F (CTE) 315 Technology Skills for Learning
- 3 - ED F 334 Child Growth and Development
- 3 - PSYCH 201 Introduction to Psychology
- 3 - Music Requirement⁴
- 3 - Science and Tech. in Society Requirement⁵

16

Junior Year

First Semester

- 3 - CTE 310 Designing Creative Instruction
- 3 - ED EC 336 Social Development of Infants and Young Children
- 3 - ED F 301 Principles of American Education
- 3 - ED SP 370 Introduction to Special Education
- 3 - Elective

15

Second Semester

- 3 - ED EC 300 Found. of Early Childhood Educ.
- 3 - ED EL 321 Physical Education Methods for Classroom Teachers
- 3 - ED EL 458 Health Education Methods for the Classroom Teacher
- 3 - ED SP 468 Early Intervention for Infants and Children with Special Needs
- 3 - READ 458 Early Literacy: Birth–Kindergarten

15

Senior Year

First Semester

- 3 - ED EC 400 Observation and Assessment in Clinical Settings⁶
- 3 - ED EC 420 Early Childhood Science⁶
- 3 - ED EC 430 Early Childhood Mathematics⁶
- 3 - ED EC 440 Integrated Language Arts and Social Studies in Primary Schools⁶
- 3 - ED EC 450 Early Childhood Curriculum⁶
- 3 - READ 459 Teaching Reading in the Early Grades: K–3⁶

18

Second Semester

- 12 - ED EC 484 Directed Teaching in Early Childhood Education
- 1 - ED F 425 Instructional Technology Strategies

13

124 Total Semester Hours

¹Two semesters (through 202) in a modern foreign language are required. Spanish is recommended.

²One biological science and one physical science course, each with laboratory, must be selected from General Education Requirements. See advisor.

³ENGL 212, 213, 214, or 215

⁴MUSIC 210, 311, 313, 314, 317, or 400

⁵See General Education Requirements.

⁶ED EC 400, 420, 430, 440, 450, and READ 459 must be taken concurrently during the fall semester of the senior year.

ELEMENTARY EDUCATION

Bachelor of Arts

The Elementary Education curriculum prepares students for teaching on the elementary school level (grades 2–6).

Freshman Year

First Semester

- 3 - GEOG 103 World Regional Geography
- 3 - HIST 122 History, Technology, and Society
- 3 - MTHSC 101 Essential Math. for Informed Soc.
- 4 - PH SC 108 Introduction to Physical Science
- 3 - Foreign Language Requirement¹

16

Second Semester

- 2 - ED 105 Orientation to Education
- 3 - ENGL 103 Accelerated Composition
- 3 - MTHSC 117 Mathematics for Elementary School Teachers I
- 4 - PH SC 107 Introduction to Earth Science
- 3 - Foreign Language Requirement¹

15

Sophomore Year

First Semester

- 4 - BIOL 109 Introduction to Life Science
- 3 - COMM 150 Intro. to Human Comm. or
3 - COMM 250 Public Speaking
- 3 - ED F 301 Principles of American Education
- 3 - MTHSC 118 Mathematics for Elementary School Teachers II
- 3 - Arts and Humanities (Literature) Requirement²

16

Second Semester

- 3 - ED F 302 Educational Psychology
- 1 - ED F (CTE) 315 Technology Skills for Learning
- 3 - ED F 334 Child Growth and Development
- 3 - ED SP 370 Introduction to Special Education
- 3 - MUSIC 210 Music Appreciation or
3 - MUSIC 400 Music in the Elem. Classroom
- 3 - Arts and Humanities (Non-Lit.) Requirement³

16

Junior Year

First Semester

- 3 - CTE 310 Designing Creative Instruction
- 3 - ED 322 Responding to Emergencies or
3 - PRTM 317 Group Initiatives
- 3 - ED EL 458 Health Education Methods for the Classroom Teacher
- 3 - ENGL 385 Children's Literature
- 3 - Multicultural Requirement⁴

15

Second Semester

- 3 - ED EL 321 Physical Education Methods for Classroom Teachers
- 3 - ED F 308 Classroom Assessment
- 3 - READ 460 Teaching Reading in the Elementary Grades: 2–6
- 6 - Elective

15

Senior Year

(Courses must be taken as listed in both semesters.)

First Semester

- 3 - ED EL 401 Elementary Field Experience
- 3 - ED EL 451 Elem. Methods in Science Teaching
- 3 - ED EL 452 Elem. Methods in Math. Teaching
- 3 - ED EL 487 Elementary Methods in Social Studies Teaching
- 3 - ED EL 488 Elementary Methods in Language Arts Teaching
- 1 - ED F 425 Instructional Technology Strategies
- 3 - READ 461 Content Area Reading: Grades 2–6

19

Second Semester

- 12 - ED EL 481 Dir. Teaching in the Elem. Sch.

12

124 Total Semester Hours

¹Two semesters (through 202) in the same modern foreign language (including American Sign Language) are required.

²ENGL 212, 213, 214 or 215

³A A H 210, HUM 301, 302, or THEA 210

⁴ANTH 201, ED 405, ED EL 311, PSYCH 201, SOC 201, or 202 is recommended.

MATHEMATICS TEACHING

Bachelor of Science

The program leading to a Bachelor of Science degree in Mathematics Teaching is designed for students planning to teach mathematics on the secondary school level (grades 9-12).

Freshman Year

First Semester

- 4 - CH 105 Chemistry in Context I
- 2 - ED 105 Orientation to Education
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - PHIL 102 Introduction to Logic
- 3 - Cross-Cultural Awareness Requirement¹

16

Second Semester

- 4 - CH 106 Chemistry in Context II
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - MTHSC 129 Prob. Solving in Discrete Math.
- 3 - Science Requirement²

17

Sophomore Year

First Semester

- 3 - COMM 150 Intro. to Human Comm. or
3 - COMM 250 Public Speaking
- 3 - EDSEC 226 A Prof. Approach to Sec. Algebra
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 122 Physics with Calculus I
- 1 - PHYS 124 Physics Lab. I
- 3 - Arts and Humanities (Literature) Requirement³

17

Second Semester

- 3 - ECON 200 Economic Concepts or
3 - ECON 211 Principles of Microeconomics
- 3 - ED F 302 Educational Psychology
- 1 - ED F (CTE) 315 Technology Skills for Learning
- 4 - MTHSC 208 Intro. to Ordinary Diff. Equations
- 3 - MTHSC 311 Linear Algebra
- 3 - PHYS 221 Physics with Calculus II
- 1 - PHYS 223 Physics Lab. II

18

Junior Year

First Semester

- 3 - ED F 301 Principles of American Education
- 3 - EDSEC 326 Practicum in Secondary Math.
- 3 - MTHSC 302 Statistics for Science and Engr.
- 3 - SOC 201 Introduction to Sociology or
3 - SOC 202 Social Problems
- 3 - Science Requirement⁴

15

Second Semester

- 3 - ED F 335 Adolescent Growth and Development
- 3 - ED SP 370 Introduction to Special Education
- 3 - EDSEC 437 Technology in Secondary Math.
- 3 - MTHSC 308 College Geometry
- 3 - MTHSC 412 Introduction to Modern Algebra

15

Senior Year

First Semester

- 1 - ED F 425 Instructional Technology Strategies⁴
- 3 - EDSEC 426 Teaching Secondary Mathematics⁴
- 3 - MTHSC 400 Theory of Probability or
3 - MTHSC 405 Stat. Theory and Methods II
- 3 - MTHSC 408 Topics in Geometry
- 3 - MTHSC 453 Advanced Calculus I
- 3 - READ 498 Secondary Content Area Reading⁴

16

Second Semester

- 9 - EDSEC 446 Teaching Internship in
Secondary Mathematics⁵
- 3 - EDSEC 456 Secondary Math. Capstone Sem.⁵

12

126 Total Semester Hours

See General Education Requirements.

Select from courses in ASTR, BIOL, BIOSC, CH, GEOL, PHYS

ENGL 212, 213, 214, or 215

⁴ED F 425, EDSEC 426, and READ 498 must be taken concurrently during fall semester.⁵EDSEC 446 and 456 must be taken concurrently. Offered spring semester only.

SCIENCE TEACHING

The programs leading to a Bachelor of Arts or Bachelor of Science degree in Science Teaching are designed for students planning to teach biological sciences, chemistry, earth sciences, or physical sciences on the secondary school level (grades 9-12).

Double Major in Science Teaching/ Biological Sciences

The Bachelor of Arts degree in Science Teaching—Biological Sciences offers a double major in Science Teaching and Biological Sciences. This program prepares students for teaching science on the secondary school level and graduate studies in any of the life science areas.

TEACHING AREA: BIOLOGICAL SCIENCES

Bachelor of Arts

Freshman Year

First Semester

- 5 - BIOL 110 Principles of Biology or
3 - BIOL 103 General Biology I and
1 - BIOL 105 General Biology Lab. I
- 4 - CH 101 General Chemistry
- 2 - ED 105 Orientation to Education
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - Foreign Language Requirement¹

17-18

Second Semester

- 5 - BIOL 111 Principles of Biology II or
3 - BIOL 104 General Biology I and
1 - BIOL 106 General Biology Lab. II
- 4 - CH 102 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 3 - Foreign Language Requirement¹
- 3 - Statistics Requirement²

17-18

Sophomore Year

First Semester

- 4 - CH 201 Survey of Organic Chemistry
- 3 - HIST 122 History, Technology, and Society or
3 - HIST 124 Environmental History Survey
- 3 - PHYS 207 General Physics I
- 1 - PHYS 209 General Physics I Lab
- 3 - Arts and Humanities (Literature) Requirement⁴
- 3 - Biochemistry or Genetics Requirement⁴

17

Second Semester

- 4 - BIOSC 316 Human Physiology
- 3 - ED F 301 Principles of American Education
- 1 - ED F (CTE) 315 Technology Skills for Learning
- 3 - PHYS 208 General Physics II
- 1 - PHYS 210 General Physics II Lab
- 3 - Biochemistry or Genetics Requirement⁴

15

Junior Year

First Semester

- 3 - BIOSC 461 Cell Biology
- 3 - ED F 302 Educational Psychology
- 3 - EDSEC 327 Practicum in Secondary Science
- 4 - Animal or Plant Diversity Requirement⁵
- 3 - Ecology Requirement⁵

16

Second Semester

- 3 - BIOSC 335 Evolutionary Biology
- 3 - BIOSC 482 Lab. Techniques for Teaching Sci.
- 3 - ED F 335 Adolescent Growth and Development
- 3 - ENGL 315 Scientific Writing and Comm.
- 4 - Animal or Plant Diversity Requirement⁵

16

Senior Year

First Semester

- 3 - COMM 150 Intro. to Human Communication or
3 - COMM 250 Public Speaking
- 3 - ED SP 370 Introduction to Special Education
- 3 - EDSEC 427 Teaching Secondary Science
- 3 - GEOG 103 World Regional Geography
- 3 - READ 498 Secondary Content Area Reading
- 3 - Arts and Humanities (Non-Lit.) Requirement⁶

18

Second Semester

- 9 - EDSEC 447 Teaching Internship in Sec. Sci.⁷
- 3 - EDSEC 457 Sec. Science Capstone Seminar⁷

12

128-130 Total Semester Hours

Two semesters (through 202) in a foreign language (including American Sign Language) are required.
EX ST 301, MTHSC 203, 301, or 309
ENGL 212, 213, 214, or 215

⁴One lecture course must be completed for both biochemistry (BIOSC 301 or BIOSC 305) and for genetics (GEN 300 or GEN 302).

One lecture and associated laboratory must be completed for both animal diversity (BIOSC 302/306 or BIOSC 303/307) and for plant diversity (BIOSC 304/308 or BIOSC 305/309).

BIOSC 441, 443, 446, or 470

To be taken the semester prior to EDSEC 447 and 457. EDSEC 427 and READ 498 must be taken concurrently.

⁵See General Education Requirements.

⁷EDSEC 447 and 457 must be taken concurrently. Offered spring semester only.

TEACHING AREA: BIOLOGICAL SCIENCES

Bachelor of Science

Freshman Year

First Semester

- 3 - BIOL 103 General Biology I and
 - 1 - BIOL 105 General Biology Lab. I or
 - 5 - BIOL 110 Principles of Biology I
 - 4 - CH 101 General Chemistry
 - 3 - COMM 150 Intro. to Human Communication or
 - 3 - COMM 250 Public Speaking
 - 4 - MTHSC 106 Calculus of One Variable I
- 15-16

Second Semester

- 3 - BIOL 104 General Biology II and
 - 1 - BIOL 106 General Biology Lab. II or
 - 5 - BIOL 111 Principles of Biology II
 - 4 - CH 102 General Chemistry
 - 2 - ED 105 Orientation to Education
 - 3 - ENGL 103 Accelerated Composition
 - 3 - Statistics Requirement¹
- 16-17

Sophomore Year

First Semester

- 4 - CH 201 Survey of Organic Chemistry
 - 3 - HIST 122 History, Technology, and Society or
 - 3 - HIST 124 Environmental History Survey
 - 3 - PHYS 207 General Physics I
 - 1 - PHYS 209 General Physics I Lab.
 - 3 - Biochemistry or Genetics Requirement²
 - 3 - Departmental Science Requirement³
- 17

Second Semester

- 4 - BIOSC 316 Human Physiology
 - 3 - ED F 301 Principles of American Education
 - 1 - ED F (CTE) 315 Technology Skills for Learning
 - 3 - PHYS 208 General Physics II
 - 1 - PHYS 210 General Physics II Lab.
 - 3 - Biochemistry or Genetics Requirement²
- 15

Junior Year

First Semester

- 3 - BIOSC 461 Cell Biology
 - 3 - ED F 302 Educational Psychology
 - 3 - EDSEC 327 Practicum in Secondary Science
 - 3 - Ecology Requirement⁴
 - 4 - Plant or Animal Diversity Requirement⁵
- 16

Second Semester

- 3 - BIOSC 335 Evolutionary Biology
 - 3 - BIOSC 482 Lab. Techniques for Teaching Sci.
 - 3 - ED F 335 Adolescent Growth and Development
 - 3 - Arts and Humanities (Literature) Requirement⁶
 - 4 - Plant or Animal Diversity Requirement⁵
- 16

Senior Year

First Semester

- 3 - ED SP 370 Introduction to Special Education
 - 3 - EDSEC 427 Teaching Secondary Science⁷
 - 3 - GEOG 103 World Regional Geography
 - 3 - READ 498 Secondary Content Area Reading⁷
 - 3 - Art and Humanities (Non-Lit.) Requirement⁶
- 15

Second Semester

- 9 - EDSEC 447 Teaching Internship in Sec. Sci.⁸
 - 3 - EDSEC 457 Sec. Science Capstone Seminar⁸
- 12

122-124 Total Semester Hours

¹EX ST 301, MTHSC 203, 301, or 309

²One lecture course must be completed for both biochemistry (BIOCH 301 or 305) and for genetics (GEN 300 or 302).

³See advisor.

⁴BIOSC 441, 443, 446, or 470

⁵One lecture and associated laboratory must be completed for both animal diversity (BIOSC 302/306 or 303/307) and for plant diversity (BIOSC 304/308 or 305/309).

⁶See General Education Requirements.

⁷To be taken the semester prior to EDSEC 447 and 457. EDSEC 427 and READ 498 must be taken concurrently. Offered fall semester only.

⁸EDSEC 447 and 457 must be taken concurrently. Offered spring semester only.

TEACHING AREA: PHYSICAL SCIENCES

Bachelor of Science

Freshman Year

First Semester

- 4 - CH 101 General Chemistry
 - 3 - COMM 150 Intro. Human Communication or
 - 3 - COMM 250 Public Speaking
 - 2 - ED 105 Orientation to Education
 - 3 - HIST 122 History, Technology, and Society or
 - 3 - HIST 124 Environmental History Survey
 - 4 - MTHSC 106 Calculus of One Variable I
- 16

Second Semester

- 4 - CH 102 General Chemistry
 - 3 - ENGL 103 Accelerated Composition
 - 4 - MTHSC 108 Calculus of One Variable II
 - 3 - PHYS 122 Physics with Calculus I
 - 1 - PHYS 124 Physics Lab. I
- 15

Sophomore Year

First Semester

- 5 - BIOL 110 Principles of Biology I or
 - 3 - BIOL 103 General Biology I and
 - 1 - BIOL 105 General Biology Lab. I
 - 4 - CH 201 Survey of Organic Chemistry
 - 4 - MTHSC 206 Calculus of Several Variables
 - 3 - PHYS 221 Physics with Calculus II
 - 1 - PHYS 223 Physics Lab. II
- 16-17

Second Semester

- 5 - BIOL 111 Principles of Biology II or
 - 3 - BIOL 104 General Biology II and
 - 1 - BIOL 106 General Biology Lab. II
 - 3 - CH 205 Intro. to Inorganic Chemistry
 - 3 - ED F 301 Principles of American Education
 - 1 - ED F (CTE) 315 Technology Skills for Learning
 - 3 - PHYS 222 Physics with Calculus III
 - 1 - PHYS 224 Physics Lab. III
- 15-16

Junior Year

First Semester

- 3 - ASTR 105 Physics of the Universe or
 - 3 - ASTR 102 Stellar Astronomy and
 - 1 - ASTR 104 Stellar Astronomy Lab.
 - 3 - CH 313 Quantitative Analysis
 - 1 - CH 317 Quantitative Analysis Lab.
 - 3 - ED F 302 Educational Psychology
 - 3 - EDSEC 327 Practicum in Secondary Science
 - 3 - Arts and Humanities (Literature) Requirement¹
- 16-17

Second Semester

- 3 - BIOSC 482 Lab. Techniques for Teaching Sci.
 - 3 - CH 330 Introduction to Physical Chemistry
 - 3 - ED F 335 Adolescent Growth and Development
 - 3 - Social Science Requirement²
 - 3 - Statistics Requirement³
- 15

Senior Year

First Semester

- 3 - ED SP 370 Introduction to Special Education
 - 3 - EDSEC 427 Teaching Secondary Science⁴
 - 3 - PHIL 324 Philosophy of Technology or
 - 3 - PHIL 325 Philosophy of Science or
 - 3 - PHIL 326 Science and Values
 - 3 - PHYS 311 Intro. to Meth. of Theoretical Phys.
 - 3 - READ 498 Secondary Content Area Reading⁴
- 15

Second Semester

- 9 - EDSEC 447 Teaching Internship in Sec. Sci.⁵
 - 3 - EDSEC 457 Sec. Science Capstone Seminar⁵
- 12

120-123 Total Semester Hours

¹ENGL 212, 213, 214, or 215

²ANTH 201, GEOG 103, PO SC 102, or 104

³EX ST 301, MTHSC 203, 301, or 309

⁴To be taken the semester prior to EDSEC 447 and 457. EDSEC 427 and READ 498 must be taken concurrently. Offered fall semester only.

⁵EDSEC 447 and 457 must be taken concurrently. Offered spring semester only.

SECONDARY EDUCATION

The Bachelor of Arts degree in Secondary Education is available to students preparing to teach English and mathematics on the secondary school level (grades 9-12). The Bachelor of Science degree is offered to students planning to teach social studies (economics, history, political science, psychology, and sociology). The teaching field should be selected as early as possible so that appropriate freshman and sophomore courses may be taken.

Each curriculum requires a major concentration in the teaching field. Specific courses and sequences have been designated to meet requirements for those planning to teach. The professional education courses should be completed in sequence.

TEACHING AREA: ENGLISH

Bachelor of Arts

Freshman Year

First Semester

- 3 - COMM 150 Intro. to Human Communication
- 2 - ED 105 Orientation to Education
- 3 - ENGL 103 Accelerated Composition
- 3 - HIST 172 The West and the World I
- 3 - MTHSC 101 Essential Math. for Informed Soc.
- 3 - Foreign Language Requirement¹

17

Second Semester

- 3 - BIOSC 200 Biology in the News
- 3 - ENGL 212 World Literature
- 3 - HIST 173 The West and the World II
- 3 - Foreign Language Requirement¹
- 4 - Natural Science Requirement²

16

Sophomore Year

First Semester

- 3 - ED F 301 Principles of American Education
- 3 - ENGL 310 Critical Writing About Literature
- 3 - ENGL 396 British Literature Survey I
- 3 - ENGL 398 American Literature Survey I
- 3 - PSYCH 201 Introduction to Psychology

15

Second Semester

- 3 - ED F 302 Educational Psychology
- 1 - ED F (CTE) 315 Technology Skills for Learning
- 3 - ENGL 357 Film
- 3 - ENGL 397 British Literature Survey II
- 3 - ENGL 399 American Literature Survey II
- 3 - American Literature Requirement³

16

Junior Year

First Semester

- 3 - ED F 335 Adolescent Growth and Development
- 3 - ENGL 353 Ethnic American Literature
- 3 - ENGL 400 The English Language
- 3 - HIST 361 History of England to 1688
- 3 - British Literature Before 1700 Requirement⁴

15

Second Semester

- 3 - ENGL 386 Adolescent Literature
- 3 - EDSEC 324 Practicum in Teaching Sec. English⁵
- 3 - HIST 363 History of England Since 1688 or
- 3 - HIST 365 British Cultural History
- 3 - British Literature After 1700 Requirement⁶
- 3 - Literary Theory Requirement⁷

15

Senior Year

First Semester

- 3 - ENGL 411 Shakespeare
- 3 - ENGL 485 Composition for Teachers⁸
- 3 - ED SP 370 Introduction to Special Education⁸
- 3 - EDSEC 424 Teaching Secondary English⁸
- 3 - READ 498 Secondary Content Area Reading⁸

15

Second Semester

- 1 - ED F 425 Instructional Technology Strategies⁹
- 9 - EDSEC 444 Teaching Internship in Secondary English⁹
- 3 - EDSEC 454 Secondary English Capstone Sem.⁹

13

122 Total Semester Hours

¹Two semesters (through 202) in the same modern foreign language are required.

²See General Education Requirements.

³ENGL 420, 421, 425, 426, or 455

⁴ENGL 407, 408, 410, 414, or 444

⁵Students must complete 45 hours of field experience in a public school.

⁶ENGL 415, 416, 417, 418, or 433

⁷ENGL 435, 436, 440, or 442

⁸ENGL 485, ED SP 370, EDSEC 424, and READ 498 must be taken concurrently during fall semester of senior year.

⁹ED F 425, EDSEC 444, and 454 must be taken concurrently during spring semester of senior year.

TEACHING AREA: MATHEMATICS

Bachelor of Arts

Freshman Year

First Semester

- 2 - ED 105 Orientation to Education
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - Foreign Language Requirement¹
- 4 - Natural Science Requirement²

16

Second Semester

- 4 - MTHSC 108 Calculus of One Variable II
- 3 - MTHSC 129 Problem Solving in Discrete Math.
- 3 - PHIL 102 Introduction to Logic
- 3 - PHYS 122 Physics with Calculus I
- 1 - PHYS 124 Physics Laboratory I
- 3 - Foreign Language Requirement¹

17

Sophomore Year

First Semester

- 3 - ECON 200 Economic Concepts or
- 3 - ECON 211 Principles of Microeconomics
- 3 - EDSEC 226 A Prof. Approach to Sec. Algebra
- 3 - HIST 102 History of the United States
- 4 - MTHSC 206 Calculus of Several Variables
- 1 - MTHSC 250 Intro. to Mathematical Sciences
- 3 - Computer Science Requirement³

17

Second Semester

- 3 - ED F 302 Educational Psychology
- 1 - ED F (CTE) 315 Technology Skills for Learning
- 4 - MTHSC 208 Intro. to Ordinary Diff. Equations
- 3 - MTHSC 311 Linear Algebra
- 3 - Arts and Humanities (Literature) Requirement⁴
- 3 - Science and Tech. in Society Requirement

17

Junior Year

First Semester

- 3 - ED F 301 Principles of American Education
- 3 - EDSEC 326 Practicum in Secondary Math.
- 3 - MTHSC 302 Statistics for Science and Engr.
- 3 - MTHSC 400 Theory of Probability
- 3 - Cross-Cultural Awareness Requirement¹

15

Second Semester

- 3 - ED F 335 Adolescent Growth and Development
- 3 - ED SP 370 Introduction to Special Education
- 3 - EDSEC 437 Technology in Secondary Math.
- 3 - MTHSC 308 College Geometry
- 3 - MTHSC 412 Introduction to Modern Algebra

15

Senior Year

First Semester

- 3 - COMM 250 Public Speaking
- 1 - ED F 425 Instructional Technology Strategies
- 3 - EDSEC 426 Teaching Secondary Mathematics
- 3 - MTHSC 408 Topics in Geometry
- 3 - MTHSC 453 Advanced Calculus I
- 3 - READ 498 Secondary Content Area Reading

16

Second Semester

- 9 - EDSEC 446 Teaching Internship in Secondary Mathematics⁶
- 3 - EDSEC 456 Secondary Math. Capstone Sem.

12

125 Total Semester Hours

¹Two semesters (through 202) in any modern foreign language (including American Sign Language) are required.

²See General Education Requirements

³CP SC 101, 111, or 120

⁴ENGL 212, 213, 214, or 215

⁵ED F 425, EDSEC 426, and READ 498 must be taken concurrently during fall semester.

⁶EDSEC 446 and 456 must be taken concurrently. Offered spring semester only.

TEACHING AREA: SOCIAL STUDIES (ECONOMICS)

Bachelor of Science

Freshman Year

First Semester

- 2 - ED 105 Orientation to Education
- 3 - ENGL 103 Accelerated Composition
- 3 - GEOG 101 Introduction to Geography
- 3 - HIST 122 History, Technology, and Society
- 3 - MTHSC 101 Essential Math. for Informed Soc.
- 4 - Natural Science Requirement¹

18

Second Semester

- 3 - ANTH 201 Introduction to Anthropology
 - 3 - BIOSC 200 Biology in the News
 - 3 - ENGL 214 American Literature
 - 3 - GEOG 103 World Regional Geography
 - 3 - PSYCH 201 Introduction to Psychology
 - 3 - SOC 201 Introduction to Sociology
- 18

Sophomore Year**First Semester**

- 3 - ECON 211 Principles of Microeconomics
 - 3 - ED F 302 Educational Psychology
 - 3 - HIST 101 History of the United States
 - 3 - HIST 172 The West and the World I
 - 3 - PO SC 101 American National Government
- 15

Second Semester

- 3 - ECON 212 Principles of Macroeconomics
 - 1 - ED F (CTE) 315 Technology Skills for Learning
 - 3 - HIST 102 History of the United States
 - 3 - HIST 173 The West and the World II
 - 3 - PO SC 102 Intro. to International Relations
 - 3 - Non-Western History Requirement²
- 16

Junior Year**First Semester**

- 3 - ED F 301 Principles of American Education
 - 3 - ED F 335 Adolescent Growth and Development
 - 3 - ED SEC 328 Practicum in Secondary Social Studies
 - 3 - Non-Western History Requirement²
 - 3 - Teaching Major³
- 15

Second Semester

- 3 - COMM 150 Intro. to Human Comm. or
 - 3 - COMM 250 Public Speaking
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
 - 3 - Non-Western History Requirement²
 - 6 - Teaching Major³
- 15

Senior Year**First Semester**

- 1 - ED F 425 Instructional Technology Strategies⁴
 - 3 - ED SP 370 Introduction to Special Education
 - 3 - EDSEC 428 Teaching Secondary Social Studies⁴
 - 3 - READ 498 Secondary Content Area Reading⁴
 - 3 - Teaching Major³
- 13

Second Semester

- 9 - EDSEC 448 Teaching Internship in Secondary Social Studies⁵
 - 3 - EDSEC 458 Secondary Social Studies
 - Capstone Seminar⁵
- 12

122 Total Semester Hours

¹See General Education Requirements.²See advisor.³Select from 300- and 400-level courses in economics.⁴ED F 425, EDSEC 428, and READ 498 must be taken concurrently. Offered fall semester only.⁵EDSEC 448 and 458 must be taken concurrently. Offered spring semester only.**TEACHING AREA: SOCIAL STUDIES (HISTORY)****Bachelor of Science****Freshman Year****First Semester**

- 2 - ED 105 Orientation to Education
 - 3 - ENGL 103 Accelerated Composition
 - 3 - GEOG 101 Introduction to Geography
 - 3 - HIST 122 History, Technology, and Society
 - 3 - MTHSC 101 Essential Math. for Informed Soc.
 - 4 - Natural Science Requirement¹
- 18

Second Semester

- 3 - ANTH 201 Introduction to Anthropology
 - 3 - BIOSC 200 Biology in the News
 - 3 - ENGL 214 American Literature
 - 3 - GEOG 103 World Regional Geography
 - 3 - PSYCH 201 Introduction to Psychology
- 15

Sophomore Year**First Semester**

- 3 - ECON 211 Principles of Microeconomics
 - 3 - ED F 302 Educational Psychology
 - 3 - HIST 101 History of the United States
 - 3 - HIST 172 The West and the World I
 - 3 - PO SC 101 American National Government
- 15

Second Semester

- 3 - ECON 212 Principles of Macroeconomics
 - 1 - ED F (CTE) 315 Technology Skills for Learning
 - 3 - HIST 102 History of the United States
 - 3 - HIST 173 The West and the World II
 - 3 - PO SC 102 Intro. to International Relations
 - 3 - Teaching Major²
- 16

Junior Year**First Semester**

- 3 - ED F 301 Principles of American Education
 - 3 - ED F 335 Adolescent Growth and Development
 - 3 - EDSEC 328 Practicum in Secondary Social Studies
 - 6 - Teaching Major²
- 15

Second Semester

- 3 - COMM 150 Intro. to Human Comm. or
 - 3 - COMM 250 Public Speaking
 - 3 - SOC 201 Introduction to Sociology
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
 - 6 - Teaching Major²
- 15

Senior Year**First Semester**

- 1 - ED F 425 Instructional Technology Strategies³
 - 3 - ED SP 370 Introduction to Special Education
 - 3 - EDSEC 428 Teaching Secondary Social Studies³
 - 3 - READ 498 Secondary Content Area Reading³
 - 6 - Teaching Major²
- 16

Second Semester

- 9 - EDSEC 448 Teaching Internship in Secondary Social Studies⁴
 - 3 - EDSEC 458 Secondary Social Studies
 - Capstone Seminar⁴
- 12

122 Total Semester Hours

¹See General Education Requirements.²See advisor. Select from HIST 299, 300-, and 400-level courses in history. Must include at least three hours each in U.S. history, European history, and nine hours in non-Western history. HIST 313 is recommended for those planning to teach in South Carolina.³ED F 425, EDSEC 428, and READ 498 must be taken concurrently. Offered fall semester only.⁴EDSEC 448 and 458 must be taken concurrently. Offered spring semester only.**TEACHING AREA: SOCIAL STUDIES (POLITICAL SCIENCE)****Bachelor of Science****Freshman Year****First Semester**

- 2 - ED 105 Orientation to Education
 - 3 - ENGL 103 Accelerated Composition
 - 3 - GEOG 101 Introduction to Geography
 - 3 - HIST 122 History, Technology, and Society
 - 3 - MTHSC 101 Essential Math. for Informed Soc.
 - 4 - Natural Science Requirement¹
- 18

Second Semester

- 3 - ANTH 201 Introduction to Anthropology
 - 3 - BIOSC 200 Biology in the News
 - 3 - ENGL 214 American Literature
 - 3 - GEOG 103 World Regional Geography
 - 3 - PSYCH 201 Introduction to Psychology
 - 3 - SOC 201 Introduction to Sociology
- 18

Sophomore Year**First Semester**

- 3 - ECON 211 Principles of Microeconomics
 - 3 - ED F 302 Educational Psychology
 - 3 - HIST 101 History of the United States
 - 3 - HIST 172 The West and the World I
 - 3 - PO SC 101 American National Government
- 15

Second Semester

- 3 - ECON 212 Principles of Macroeconomics
 - 1 - ED F (CTE) 315 Technology Skills for Learning
 - 3 - HIST 102 History of the United States
 - 3 - HIST 173 The West and the World II
 - 3 - PO SC 102 Intro. to International Relations
 - 3 - Non-Western History Requirement²
- 16

Junior Year**First Semester**

- 3 - ED F 301 Principles of American Education
 - 3 - ED F 335 Adolescent Growth and Development
 - 3 - EDSEC 328 Practicum in Secondary Social Studies
 - 3 - Non-Western History Requirement²
 - 3 - Teaching Major³
- 15

Second Semester

- 3 - COMM 150 Intro. to Human Comm. or
3 - COMM 250 Public Speaking
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
 - 3 - Non-Western History Requirement²
 - 6 - Teaching Major³
- 15

Senior Year**First Semester**

- 1 - ED F 425 Instructional Technology Strategies⁴
 - 3 - ED SP 370 Introduction to Special Education
 - 3 - EDSEC 428 Teaching Secondary Social Studies⁴
 - 3 - READ 498 Secondary Content Area Reading⁴
 - 3 - Teaching Major³
- 13

Second Semester

- 9 - EDSEC 448 Teaching Internship in
Secondary Social Studies⁵
 - 3 - EDSEC 458 Secondary Social Studies
Capstone Seminar⁵
- 12

122 Total Semester Hours

¹See General Education Requirements.²See advisor.³See advisor. Select from the following, including at least one course from three of the following areas:

- American Government—PO SC 403, 405, 416, 437, 438, 442
- Comparative Politics—PO SC 371, 459, 466, 471, 472, 473, 476, 477, 478
- International Relations—PO SC 361, 362, 363, 428, 456
- Public Policy and Administration—PO SC 302, 321, 421, 423, 424, 430

⁴ED F 425, EDSEC 428, and READ 498 must be taken concurrently. Offered fall semester only.⁵EDSEC 448 and 458 must be taken concurrently. Offered spring semester only.**TEACHING AREA: SOCIAL STUDIES (PSYCHOLOGY)****Bachelor of Science****Freshman Year****First Semester**

- 2 - ED 105 Orientation to Education
 - 3 - ENGL 103 Accelerated Composition
 - 3 - GEOG 101 Introduction to Geography
 - 3 - HIST 122 History, Technology, and Society
 - 3 - MTHSC 101 Essential Math. for Informed Soc.
 - 4 - Natural Science Requirement¹
- 18

Second Semester

- 3 - ANTH 201 Introduction to Anthropology
 - 3 - BIOSC 200 Biology in the News
 - 3 - ENGL 214 American Literature
 - 3 - GEOG 103 World Regional Geography
 - 3 - PSYCH 201 Introduction to Psychology
 - 3 - SOC 201 Introduction to Sociology
- 18

Sophomore Year**First Semester**

- 3 - ECON 211 Principles of Microeconomics
 - 3 - ED F 302 Educational Psychology
 - 3 - HIST 101 History of the United States
 - 3 - HIST 172 The West and the World I
 - 3 - PO SC 101 American National Government
- 15

Second Semester

- 3 - ECON 212 Principles of Macroeconomics
 - 1 - ED F (CTE) 315 Technology Skills for Learning
 - 3 - HIST 102 History of the United States
 - 3 - HIST 173 The West and the World II
 - 3 - PO SC 102 Intro. to International Relations
 - 3 - Non-Western History Requirement²
- 16

Junior Year**First Semester**

- 3 - ED F 301 Principles of American Education
 - 3 - ED F 335 Adolescent Growth and Development
 - 3 - EDSEC 328 Practicum in Secondary Social
Studies
 - 3 - Non-Western History Requirement²
 - 3 - Teaching Major³
- 15

Second Semester

- 3 - COMM 150 Intro. to Human Comm. or
3 - COMM 250 Public Speaking
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
 - 3 - Non-Western History Requirement²
 - 6 - Teaching Major³
- 15

Senior Year**First Semester**

- 1 - ED F 425 Instructional Technology Strategies⁴
 - 3 - ED SP 370 Introduction to Special Education
 - 3 - EDSEC 428 Teaching Secondary Social Studies⁴
 - 3 - READ 498 Secondary Content Area Reading⁴
 - 3 - Teaching Major³
- 13

Second Semester

- 9 - EDSEC 448 Teaching Internship in
Secondary Social Studies⁵
 - 3 - EDSEC 458 Secondary Social Studies
Capstone Seminar⁵
- 12

122 Total Semester Hours

¹See General Education Requirements.²See advisor.³Select from 300- and 400-level courses in psychology⁴ED F 425, EDSEC 428, and READ 498 must be taken concurrently. Offered fall semester only.⁵EDSEC 448 and 458 must be taken concurrently. Offered spring semester only.**TEACHING AREA: SOCIAL STUDIES (SOCIOLOGY)****Bachelor of Science****Freshman Year****First Semester**

- 2 - ED 105 Orientation to Education
 - 3 - ENGL 103 Accelerated Composition
 - 3 - GEOG 101 Introduction to Geography
 - 3 - HIST 122 History, Technology, and Society
 - 3 - MTHSC 101 Essential Math. for Informed Soc.
 - 4 - Natural Science Requirement¹
- 18

Second Semester

- 3 - ANTH 201 Introduction to Anthropology
 - 3 - BIOSC 200 Biology in the News
 - 3 - ENGL 214 American Literature
 - 3 - GEOG 103 World Regional Geography
 - 3 - PSYCH 201 Introduction to Psychology
 - 3 - SOC 201 Introduction to Sociology
- 18

Sophomore Year**First Semester**

- 3 - ECON 211 Principles of Microeconomics
 - 3 - ED F 302 Educational Psychology
 - 3 - HIST 101 History of the United States
 - 3 - HIST 172 The West and the World I
 - 3 - PO SC 101 American National Government
- 15

Second Semester

- 3 - ECON 212 Principles of Macroeconomics
 - 1 - ED F (CTE) 315 Technology Skills for Learning
 - 3 - HIST 102 History of the United States
 - 3 - HIST 173 The West and the World II
 - 3 - PO SC 102 Intro. to International Relations
 - 3 - Non-Western History Requirement²
- 16

Junior Year**First Semester**

- 3 - ED F 301 Principles of American Education
 - 3 - ED F 335 Adolescent Growth and Development
 - 3 - EDSEC 328 Practicum in Secondary Social
Studies
 - 3 - Non-Western History Requirement²
 - 3 - Teaching Major³
- 15

Second Semester

- 3 - COMM 150 Intro. to Human Comm. or
3 - COMM 250 Public Speaking
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
 - 3 - Non-Western History Requirement²
 - 6 - Teaching Major³
- 15

Senior Year**First Semester**

- 1 - ED F 425 Instructional Technology Strategies⁴
 - 3 - ED SP 370 Introduction to Special Education
 - 3 - EDSEC 428 Teaching Secondary Social Studies⁴
 - 3 - READ 498 Secondary Content Area Reading⁴
 - 3 - Teaching Major³
- 13

Second Semester

- 9 - EDSEC 448 Teaching Internship in
Secondary Social Studies⁵
3 - EDSEC 458 Secondary Social Studies
Capstone Seminar⁵
12

122 Total Semester Hours

⁵See General Education Requirements.

⁶See advisor.

⁷Select from 300- and 400-level courses in sociology.

⁸ED F 425, EDSEC 428, and READ 498 must be taken concurrently. Offered fall semester only.

⁹EDSEC 448 and 458 must be taken concurrently. Offered spring semester only.

SPECIAL EDUCATION**Bachelor of Arts**

The Bachelor of Arts degree in Special Education prepares students to teach individuals with mild disabilities in grades K–12. The curriculum is designed to meet the competencies outlined by the Council for Exceptional Children for beginning special education teachers. Students completing the program receive instruction and practical experiences that lead to Multi-Categorical Special Education Certification in South Carolina.

Freshman Year**First Semester**

- 2 - ED 105 Orientation to Education
3 - HIST 124 Environmental History Survey or
3 - HIST 122 History, Technology, and Society
3 - MTHSC 101 Essential Math. for Informed Soc.
3 - Foreign Language Requirement¹
4 - Natural Science Requirement²
15

Second Semester

- 3 - ENGL 103 Accelerated Composition
3 - GEOG 103 World Regional Geography
3 - MTHSC 117 Mathematics for Elementary
School Teachers I
3 - Foreign Language Requirement¹
4 - Natural Science Requirement²
16

Sophomore Year**First Semester**

- 3 - ED F 301 Principles of American Education
1 - ED F (CTE) 315 Technology Skills for Learning
3 - ED SP 370 Introduction to Special Education
3 - MTHSC 118 Mathematics for Elementary
School Teachers II
3 - Arts and Humanities (Literature) Requirement³
4 - Natural Science Requirement²
17

Second Semester

- 3 - COMM 150 Intro. to Human Comm. or
3 - COMM 250 Public Speaking
3 - ED F 302 Educational Psychology
3 - ED F 334 Child Growth and Development or
3 - ED F 335 Adolescent Growth and Dev.
3 - ED SP 468 Early Intervention for Infants and
Children with Special Needs
3 - Arts and Humanities (Non-Lit.) Requirement⁴
15

Junior Year**First Semester**

- 3 - ED EL 458 Health Education Methods for the
Classroom Teacher⁵
3 - ED SP 372 Char. and Instruction of
Individuals with Learning Disabilities⁵
3 - ED SP 374 Char. and Strat. for Individuals
with Emotional/Behavioral Disorders⁵
3 - History Requirement⁶
3 - Elective
15

Second Semester

- 3 - ED EL 451 Elem. Meth. in Science Teaching⁷
3 - ED EL 487 Elementary Methods in Social
Studies Teaching
3 - ED SP 373 Char. and Instruction of
Individuals with Mental Retardation⁷
3 - ED SP 491 Educational Assessment of
Individuals with Disabilities⁷
3 - READ 460 Teaching Reading in the
Elementary Grades: 2–6
15

Senior Year**First Semester**

- 1 - ED F 425 Instructional Technology Strategies⁸
3 - ED SP 492 Mathematics Instruction for
Individuals with Mild Disabilities⁸
3 - ED SP 493 Classroom and Behavior
Management for Special Educators⁸
3 - ED SP 494 Teaching Reading to Students
with Mild Disabilities⁸
3 - ED SP 496 Special Education Field Experience⁸
3 - ED SP 497 Secondary Methods for Individuals
with Disabilities⁸
16

Second Semester

- 3 - ED SP 495 Written Communication and
Collaboration for the Resource Teacher⁹
12 - ED SP 498 Directed Teaching in Special Ed.⁹
15

124 Total Semester Hours

¹Two semesters (through 202) in the same modern foreign language (including American Sign Language) are required.

²See General Education Requirements. Eight credit hours must be in a sequence. Biological and physical sciences must be represented. PH SC 107, 108, and BIOL 109 are recommended.

³ENGL 212, 213, 214, or 215

⁴See General Education Requirements.

⁵ED EL 458, ED SP 372 and 374 must be taken concurrently during the fall semester of junior year.

⁶HIST 101, 102, 172, 173, or 193

⁷ED EL 451, ED SP 373, and 491 must be taken concurrently during the spring semester of the junior year.

⁸ED F 425, ED SP 492, 493, 494, 496, and 497 must be taken concurrently during the fall semester of the senior year.

⁹ED SP 495 and 498 must be taken concurrently during the spring semester of the senior year.

HEALTH SCIENCE**Bachelor of Science**

The Department of Public Health Sciences prepares students for careers in the health field, one of the largest industries in the United States. It includes hospitals and other medical service providers, public health organizations, health insurance companies, health/medical related sales, health fitness organizations, and community and nonprofit health agencies.

Plans of study can be arranged in health promotion and education, health services administration, and preprofessional health studies. Students in the Health Promotion and Education Concentration have the skills to assess, plan, communicate, implement, manage, and evaluate public health promotion programs. Students in the Preprofessional Health Studies Concentration obtain the coursework and experience necessary for acceptance into various graduate programs in clinical health professions. The Health Services Administration Concentration allows students to develop skills and competencies in health administration/management for entry-level careers or graduate study in this area. A minor in Business Administration is integral to the concentration. The department, in cooperation with the College of Architecture, Arts and Humanities, also offers a joint Bachelor of Science degree in Language and International Health (see page 66).

When space is available, students with fewer than 50 credit hours earned may apply to change majors into Health Science with a minimum cumulative grade-point ratio of 2.25. Students with 50 or more credit hours may apply for a change-of-major into Health Science when space is available based on the following restrictions:

- completion of the Health Science Mathematics and Statistics Requirements and the General Education Natural Science Requirement
- minimum cumulative grade-point ratio of 2.5
- submission of a 1–3-page document detailing why the applicant desires to major in Health Science and how this major would support his/her career goals

Additional information is available at www.hehd.clemson.edu/PublicHealth/index.htm.

HEALTH PROMOTION AND EDUCATION CONCENTRATION**Freshman Year****First Semester**

- 3 - BIOL 103 General Biology I and
1 - BIOL 105 General Biology Lab. I or
5 - BIOL 110 Principles of Biology I
3 - HLTH 202 Introduction to Public Health
3 - PSYCH 201 Introduction to Psychology
3 - SOC 201 Introduction to Sociology
1 - Elective
14-15

Second Semester

- 3 - ENGL 103 Accelerated Composition
 - 3 - Health Requirement¹
 - 3-4 - Mathematics Requirement²
 - 3 - Social Science Requirement³
 - 4 - Elective
-
- 16-17

Sophomore Year**First Semester**

- 4 - CH 101 General Chemistry or
 - 4 - CH 105 Chemistry in Context I
 - 3 - HLTH 298 Human Health and Disease
 - 3 - NUTR 203 Principles of Human Nutrition
 - 3 - Guided Requirement⁴
 - 3 - Statistics Requirement⁵
-
- 16

Second Semester

- 4 - CH 102 General Chemistry or
 - 4 - CH 106 Chemistry in Context II
 - 3 - COMM 150 Intro. to Human Comm. or
 - 3 - COMM 250 Public Speaking
 - 3 - HLTH 240 Determinants of Health Behavior
 - 1 - HLTH 398 Health Appraisal Skills
 - 3 - PSYCH 340 Lifespan Developmental Psych.
-
- 14

Junior Year**First Semester**

- 4 - BIOSC 222 Human Anatomy and Phys. I
 - 3 - HLTH 303 Public Health Communication
 - 3 - HLTH 340 Hlth. Promotion Program Planning
 - 3 - HLTH 380 Epidemiology
 - 3 - Guided Requirement⁴
-
- 16

Second Semester

- 4 - BIOSC 223 Human Anatomy and Phys. II
 - 1 - HLTH 419 Health Science Internship Preparation Seminar
 - 3 - HLTH 480 Community Health Promotion
 - 3 - HLTH 490 Research and Evaluation Strategies for Public Health
 - 3 - Arts and Humanities (Non-Lit.) Requirement³
 - 1 - Elective
-
- 15

Senior Year**First Semester**

- 5 - HLTH 420 Health Science Internship⁶
 - 3 - HLTH 440 Managing Health Service Org.
 - 3 - Health Requirement¹
 - 3 - Elective
-
- 14

Second Semester

- 3 - Arts and Humanities (Literature) Requirement³
 - 6 - Guided Requirement⁴
 - 3 - Health Requirement¹
 - 3 - Elective
-
- 15

120-122 Total Semester Hours

¹Any HLTH course not otherwise required

²MTHSC 101, 102, or 106

³See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

⁴See advisor.

⁵EX ST 301, MTHSC 203, 301 or 309

⁶Internship may be done fall, spring, or summer after completing HLTH 419. A grade-point ratio of 2.0 is required for registration.

Notes:

1. A minimum grade-point ratio of 2.0 is required for registration in each HLTH course.

2. Students who wish to pursue preprofessional options should take CH 101 and 102.

HEALTH SERVICES ADMINISTRATION CONCENTRATION

Freshman Year**First Semester**

- 3 - ECON 211 Principles of Microeconomics
 - 3 - HLTH 202 Introduction to Public Health
 - 4 - Natural Science Requirement¹
 - 3 - Social Science Requirement²
 - 2 - Elective
-
- 15

Second Semester

- 3 - ECON 212 Principles of Macroeconomics
 - 3 - ENGL 103 Accelerated Composition
 - 3 - HLTH 298 Human Health and Disease
 - 3 - Guided Requirement³
 - 3-4 - Mathematics Requirement⁴
-
- 15-16

Sophomore Year**First Semester**

- 3 - ACCT 201 Financial Accounting Concepts
 - 3 - C R D (AP EC, HLTH) 361 Introduction to Health Care Economics
 - 3 - HLTH 203 Overview of Health Care Systems
 - 3 - Health Requirement⁵
 - 3 - Statistics Requirement⁶
-
- 15

Second Semester

- 3 - COMM 150 Intro. to Human Comm. or
 - 3 - COMM 250 Public Speaking
 - 3 - HLTH 240 Determinants of Health Behavior
 - 3 - MGT 201 Principles of Management
 - 3 - Guided Requirement³
 - 3 - Social Science Requirement²
-
- 15

Junior Year**First Semester**

- 3 - HLTH 380 Epidemiology
 - 3 - LAW 322 Legal Environment of Business
 - 3 - MKT 301 Principles of Marketing
 - 3 - Guided Requirement³
 - 3 - Elective
-
- 15

Second Semester

- 1 - HLTH 419 Health Science Internship Preparation Seminar
 - 3 - HLTH 490 Research and Evaluation Strategies for Public Health
 - 3 - Arts and Humanities (Literature) Requirement²
 - 3 - Guided Requirement¹
 - 3 - Health Requirement⁵
 - 3 - Elective
-
- 16

Senior Year**First Semester**

- 3 - FIN 306 Corporation Finance
 - 5 - HLTH 420 Health Science Internship
 - 3 - HLTH 440 Managing Health Service Org.
 - 3 - HLTH 460 Health Information Systems
-
- 14

Second Semester

- 3 - HLTH 475 Principles of Health Care Operations Management and Research
 - 3 - HLTH 478 Health Policy Ethics and Law
 - 3 - HLTH 479 Financial Management and Budgeting for Health Service Organizations
 - 3 - Arts and Humanities (Non-Lit.) Requirement³
 - 3 - Guided Requirement⁴
-
- 15

120-121 Total Semester Hours

¹BIOL 103/105, 110, CH 101, 105, PHYS 122, 124, or 207/209

²See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements

³See advisor. Courses in Spanish are strongly recommended.

⁴MTHSC 101, 102, or 106

⁵Any HLTH course not otherwise required

⁶EX ST 301, MTHSC 203, 301, or 309

⁷Internship may be done fall, spring, or summer after completing HLTH 419.

Note: A minimum grade-point ratio of 2.0 is required for registration in each HLTH course

PREPROFESSIONAL HEALTH STUDIES CONCENTRATION

Freshman Year**First Semester**

- 3 - BIOL 103 General Biology I and
 - 1 - BIOL 105 General Biology Lab. I or
 - 5 - BIOL 110 Principles of Biology I
 - 4 - CH 101 General Chemistry I
 - 3 - HLTH 202 Introduction to Public Health
 - 3 - Social Science Requirement¹
-
- 14-15

Second Semester

- 3 - BIOL 104 General Biology II and
 - 1 - BIOL 106 General Biology Lab. II or
 - 5 - BIOL 111 Principles of Biology II
 - 4 - CH 102 General Chemistry II
 - 3 - ENGL 103 Accelerated Composition
 - 3 - Guided Requirement²
 - 3-4 - Mathematics Requirement³
-
- 17-19

Sophomore Year**First Semester**

- 4 - BIOSC 222 Human Anatomy and Phys. I
 - 3 - HLTH 298 Human Health and Disease
 - 3 - Guided Requirement⁴
 - 3 - Health Requirement⁴
 - 3 - Statistics Requirement⁵
-
- 16

Second Semester

- 4 - BIOSC 223 Human Anatomy and Phys. II
- 3 - COMM 150 Intro. to Human Comm. or
3 - COMM 250 Public Speaking
- 3 - HLTH 240 Determinants of Health Behavior
- 3 - Social Science Requirement¹
- 3 - Elective

16

Junior Year**First Semester**

- 3 - HLTH 380 Epidemiology
- 3 - PHYS 207 General Physics I
- 1 - PHYS 209 General Physics I Lab.
- 4 - Guided Requirement²
- 3 - Health Requirement⁴
- 1 - Elective

15

Second Semester

- 1 - HLTH 419 Health Science Internship
Preparation Seminar
- 3 - HLTH 490 Research and Evaluation
Strategies for Public Health
- 3 - PHYS 208 General Physics II
- 1 - PHYS 210 General Physics II Lab.
- 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 4 - Guided Requirement²

15

Senior Year**First Semester**

- 5 - HLTH 420 Health Science Internship⁶
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - Health Requirement⁴
- 3 - Elective⁷

14

Second Semester

- 3 - HLTH 440 Managing Health Service Org.
- 3 - Health Requirement⁴
- 7 - Elective⁷

13

120-123 Total Semester Hours

¹See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

²See advisor. Courses in Spanish are strongly recommended.

³MTHSC 101, 102, or 106

⁴Any HLTH course not otherwise required

EX ST 301, MTHSC 203, 301, or 309

⁶Internship must be completed in one or two semesters. Internship may be done fall, spring, or summer after completing HLTH 419. Prior approval is required for summer internships. A grade-point ratio of 2.0 is required for registration.

Physician's Assistant, predentistry, and premedicine students may also need BIOCH 301 and eight credit hours of organic chemistry. Some programs also require a course in microbiology.

Note: A minimum grade-point ratio of 2.0 is required for registration in each HLTH course.

LANGUAGE AND INTERNATIONAL HEALTH**Bachelor of Science**

The Language and International Health program is administered by the College of Architecture, Arts and Humanities and the College of Health, Education and Human Development. See page 66 for the curriculum.

NURSING**Bachelor of Science**

The Bachelor of Science degree program in Nursing prepares students for professional nursing practice in a variety of settings, such as hospitals, industry, clinics, and public health agencies. During the first two years, emphasis is on liberal arts and basic science courses arranged to provide a foundation for the nursing major. Junior and senior courses emphasize the study of nursing. Clinical nursing experiences, guided by the Nursing faculty, involve acute and community-based settings. Students are responsible for their own transportation to clinical laboratory experiences, which may extend throughout the Upstate.

Throughout the clinical laboratory period, Nursing majors are required to carry current, valid student nurses' professional liability insurance with minimum limits of liability of \$1,000,000 per occurrence and \$6,000,000 in aggregate. Documentation of such coverage must be provided to the Director of the School of Nursing. No student may participate in clinical learning activities without this insurance coverage.

To comply with clinical agency contract requirements and South Carolina law, students enrolled in nursing courses with a clinical laboratory must meet specific requirements listed in the *School of Nursing Student Handbook* at www.clemson.edu/hehd/nursing.

The School of Nursing programs are accredited by the CCNE (Commission on Collegiate Nursing Education), One Dupont Circle NW, Suite 530, Washington, DC 20036-1120.

Entrance Requirements

To facilitate admission of students who can achieve at an appropriate level in the program, admission is selective. Consideration is given to performance in secondary school and on the College Board Examination (SAT). Those seeking admission are advised to apply to the University early in the fall of the senior year in high school.

Transfer admission is competitive and students are encouraged to apply early to the Office of Admissions. The University admits ten new transfer students to the Nursing major during the fall semester only. Potential students should have a minimum grade point ratio of 3.0 and completion of 30 semester hours of transferable courses. Placement in the Nursing curriculum will be determined after credit evaluation is completed.

Students may change majors into Nursing based on approval of an Admissions Committee in the School of Nursing. Applications are accepted each year during January with a deadline of January 31. Decisions are made by February 28. Change-of-major students will have a start date of the following January into upper division (junior-level) nursing courses. Applicants should meet the following requirements prior to the semester of application: a minimum cumulative grade-point ratio of 2.75, completion of a minimum of two required sciences in the Nursing curriculum with a C or better. Selection priority is based on grade-point ratio and number of completed nursing prerequisites. Students are allowed to apply only twice. Detailed information is available from the Academic Advising Center in 309 Edwards Hall or at www.clemson.edu/hehd/nursing.

Freshman Year**First Semester¹**

- 3 - BIOL 103 General Biology I
- 1 - BIOL 105 General Biology Lab. I
- 3 - COMM 150 Intro. to Human Comm. or
3 - COMM 250 Public Speaking
- 2 - C U 101 University Success Skills
- 3 - NURS 140 Computer Appl. in Health Care
- 3 - SOC 201 Introduction to Sociology

15

Second Semester

- 4 - CH 101 General Chemistry I
- 3 - ENGL 103 Accelerated Composition
- 3 - MTHSC 203 Elementary Statistical Inference
- 3 - PSYCH 201 Introduction to Psychology
- 3 - Arts and Humanities (Non-Lit.) Requirement²

16

Sophomore Year**First Semester**

- 4 - BIOSC 222 Human Anatomy and Phys. I
- 4 - MICRO 205 Introductory Microbiology
- 3 - NUTR 205 Nutrition for Nursing Professionals
- 3 - Arts and Humanities (Literature) Requirement²

1 - Elective

15

Second Semester

- 4 - BIOSC 223 Human Anatomy and Phys. II
- 2 - NURS 320 Professionalism in Nursing
- 3 - NURS 333 Health Care Genetics
- 3 - Cross-Cultural Awareness Requirement^{2,3}

3 - Elective

15

Junior Year**First Semester**

- 3 - ENGL 304 Business Writing or
3 - ENGL 314 Technical Writing
- 3 - NURS 304 Pathophysiology for Health Care Professionals
- 3 - NURS 310 Health Assessment
- 4 - NURS 312 Medical-Surgical I: Therapeutic Nursing Interventions
- 3 - NURS 340 Pharmacotherapeutic Nursing Interventions

16

Second Semester

- 7 - NURS 303 Medical-Surg. II: Nursing of Adults
- 3 - NURS 305 Psychosocial Nursing
- 2 - NURS 311 Health Promotion Across the Lifespan
- 2 - NURS 323 Gerontology Nursing
- 3 - NURS 330 Research in Nursing

17**Senior Year****First Semester**

- 5 - NURS 401 Mental Health Nursing
- 5 - NURS 411 Nursing Care of Children
- 5 - NURS 412 Nursing Care of Women and Their Families

15**Second Semester**

- 5 - NURS 403 Medical-Surgical III: Complex Nursing of Adults
- 6 - NURS 410 Leadership Management and Nursing Care Practicum
- 4 - NURS 415 Community Health Nursing

15**124 Total Semester Hours**

Students scoring 2 or below on the CMPT must take MTHSC 101 as a prerequisite for CH 101 during this semester.

See General Education Requirements.

If this requirement is satisfied by another course in the curriculum, elective hours may be substituted.

Notes:

1. A minimum grade of a C is required in the following courses for progression to junior year clinical courses: BIOL 103/105, BIOSC 222, 223, CH 101, MICRO 205, MTHSC 101, 203, NUTR 205.

2. A minimum grade of C is required in all nursing courses.

3. To progress to junior-level nursing courses, students must have a minimum grade-point ratio of 2.5 and may not have received more than two final course grades of less than a C in the last five years.

4. A minimum grade-point ratio of 2.5 must be achieved in all required nursing courses for progression to the next level. Only courses required for the Nursing curriculum, including the allotted three elective credit hours, will be used to calculate this grade-point ratio.

5. Students may repeat only one nursing course, excluding a W or redemption. Further, students may repeat that nursing course one time only. Students who are unsuccessful on the second attempt in a nursing course will be counseled to select another major and will not be permitted to continue in the Nursing program.

6. Students must pass didactic and clinical components to pass all clinical courses.

Registered Nurse BS Completion Program

The RN/BS curriculum offers an individualized study option for the registered nurse to obtain a baccalaureate degree in Nursing. Credits may be earned through an accelerated program of study, combining transfer credits for selected courses from accredited institutions of higher learning, credit by examination for previously completed nursing courses, and enrollment in courses at Clemson University. Qualified students may take up to six hours of graduate courses towards the master's degree in Nursing. Registered nurses interested in pursuing a baccalaureate degree should contact the School of Nursing for curriculum requirements. This program is offered at the University Center of Greenville.

Freshman Year**First Semester**

- 3 - MTHSC 101 Essential Math for Informed Soc.
- 3 - SOC 201 Introduction to Sociology
- 3 - Arts and Humanities (Non-Lit.) Requirement
- 3 - Computer Skills Requirement
- 4 - Science Requirement¹

16**Second Semester**

- 3 - ENGL 103 Accelerated Composition
- 3 - MTHSC 203 Elementary Statistical Inference
- 3 - PSYCH 201 Introduction to Psychology
- 4 - Science Requirement
- 3 - Elective

16**Sophomore Year****First Semester**

- 4 - BIOSC 222 Human Anatomy and Phys. I
- 4 - MICRO 205 Introductory Microbiology
- 3 - Arts and Humanities (Literature) Requirement¹
- 4 - Elective

15**Second Semester**

- 4 - BIOSC 223 Human Anatomy and Phys. II
- 3 - Departmental Requirement
- 3 - Nutrition Requirement¹
- 3 - Oral Communication Requirement¹
- 3 - Elective

16**Junior Year****First Semester**

- 3 - NURS 304 Pathophysiology for Health Care Professionals
- 4 - NURS 312 Medical-Surgical I: Therapeutic Nursing Interventions¹
- 3 - NURS 330 Research in Nursing
- 5 - NURS 411 Nursing Care of Children¹

15**Second Semester**

- 7 - NURS 303 Medical-Surg. II: Nursing of Adults¹
- 4 - NURS 307 Family Nursing in the Community
- 4 - NURS 313 Health Assess. Through Lifespan

15**Senior Year****First Semester**

- 3 - NURS 333 Health Care Genetics
- 3 - NURS 406 Issues in Professionalism
- 5 - NURS 412 Nurs. Care of Women and Families¹
- 4 - NURS 425 Community Nursing

15**Second Semester**

- 3 - ENGL 314 Technical Writing
- 5 - NURS 401 Mental Health Nursing¹
- 5 - NURS 403 Medical-Surgical III: Complex Nursing of Adults¹
- 3 - NURS 405 Leadership and Mgt. in Nursing

16**124 Total Semester Hours**

See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

See advisor

This course is exempt if the student achieves a B or better in NURS 307.

Notes:

1. A minimum grade-point ratio of 2.5 is required in all courses for progression to junior-year nursing courses and must be maintained for progression to each level.

2. Student may not exceed a maximum of two attempts, excluding a W, to complete successfully any NURS course.

3. Students must pass didactic and clinical components to pass all clinical courses.

4. Students must achieve a C or better in all required science and nursing courses.

PARKS, RECREATION AND TOURISM MANAGEMENT**Bachelor of Science**

The Department of Parks, Recreation and Tourism Management prepares students for a variety of careers in public and private leisure services. The curriculum provides a broad exposure to the management of leisure service programs and resources, such as those for municipalities, institutions, voluntary and youth-serving agencies, management positions within the travel and tourism industry and as resource managers of local, state, and federal parks and related lands and waters.

The curriculum allows students to select from five concentrations. This latitude permits accommodation of each student's career objectives in positions in community recreation, sport management, recreation programming, cultural arts management, commercial recreation, wilderness management, nature interpretation, park management, historic site management, rehabilitation services, leisure counseling, camp administration, recreation therapy, programs for people with disabilities or senior citizens, travel industry, resort management, convention and visitor bureaus, theme parks, community tourism, and special event/festival planning, to name a few.

The Parks, Recreation and Tourism Management program is accredited by the National Council on Accreditation (National Recreation and Park Association/Council on Postsecondary Accreditation). Graduates are immediately eligible to apply to become "Certified Park and Recreation Professionals," a valuable credential for professional advancement.

When space is available, a student may change majors to one of the degree concentrations in the Department of Parks, Recreation and Tourism Management with a 2.0 cumulative grade-point ratio, at least 30 credit hours earned, and approval of the department chair or his/her designee.

Graduate degrees offered are Master of Parks, Recreation and Tourism Management; Master of Science; and Doctor of Philosophy.

COMMUNITY RECREATION, SPORT AND CAMP MANAGEMENT CONCENTRATION

The Community Recreation, Sport and Camp Management (CRSCM) Concentration prepares students for careers in community recreation, amateur athletics, and camp management by developing theoretical, conceptual, and applied knowledge bases necessary for success in its diverse field. The focus of this program is on community, family, and individual development. Career opportunities include, but are not limited to, community recreation programming, community athletic programming, camp administration, facility operation and management, special events, campus recreation, and fitness and wellness programming.

Freshman Year

First Semester

- 2 - C U 101 University Success Skills
 - 3 - ECON 211 Principles of Microeconomics
 - 3 - PSYCH 201 Introduction to Psychology or
3 - SOC 201 Introduction to Sociology
 - 3 - Mathematics Requirement¹
 - 4 - Natural Science Requirement²
- 15

Second Semester

- 3 - ENGL 103 Accelerated Composition
 - 1 - PRTM 200 Profession and Practice in PRTM
 - 3 - Mathematics or Natural Science Requirement²
 - 8 - Elective
- 15

Sophomore Year

First Semester

- 3 - COMM 150 Intro. to Human Comm. or
3 - COMM 250 Public Speaking
 - 2 - PRTM 220 Conceptual Foundations of Parks,
Recreation, and Tourism
 - 3 - Arts and Humanities (Literature) Requirement²
 - 3 - Arts and Humanities (Non-Lit.) Requirement³
 - 6 - Elective
- 17

Second Semester

- 1 - PRTM 198 Creative Inquiry—PRTM I
 - 2 - PRTM 221 Delivery Systems for Parks,
Recreation, and Tourism
 - 3 - PRTM 222 Program and Event Planning in
Parks, Recreation, and Tourism
 - 4 - PRTM 223 Administration/Management in
Parks, Recreation, and Tourism
 - 2 - PRTM 224 Legal Aspects of Parks, Recreation,
and Tourism
- 12

Summer

- 1 - PRTM 206 Practicum I
 - 1 - PRTM 207 Practicum II
- 2

Junior Year

First Semester

- 2 - PRTM 298 Creative Inquiry—PRTM II
 - 12 - Concentration Requirement⁴
- 14

Second Semester

- 2 - PRTM 398 Creative Inquiry—PRTM III
 - 1 - PRTM 404 Field Training I
 - 12 - Concentration Requirement⁴
- 15

Summer

- 6 - PRTM 405 Field Training II

Senior Year

First Semester

- 1 - PRTM 498 Creative Inquiry—PRTM IV
 - 12 - Concentration Requirement⁴
- 13

Second Semester

- 12 - Concentration Requirement⁴
- 12

121 Total Semester Hours

¹EX ST 222, 301, or MTHSC 203

²See General Education Requirements.

³A H 210, MUSIC 210, REL 101, or 102

⁴See advisor.

PARK AND PROTECTED AREA MANAGEMENT CONCENTRATION

Students in Park and Protected Area Management (PPAM) prepare for work as park rangers, planners, educators, law enforcement officers, and administrators of our nation's federal, state, and county public lands that hold unique natural, cultural, and historic resources. PPAM focuses on helping visitors enjoy and appreciate parklands while protecting those resources for future generations. Besides taking coursework in PRTM, many students choose to complete a minor field of study in forest resource management, wildlife and fisheries biology, history, or anthropology.

Freshman Year

First Semester

- 1 - BIOL 120 Biological Inquiry Lab.
 - 3 - BIOL 122 Keys to Biodiversity
 - 2 - C U 101 University Success Skills
 - 3 - PSYCH 201 Introduction to Psychology or
3 - SOC 201 Introduction to Sociology
 - 3 - Mathematics Requirement¹
 - 3 - Elective
- 15

Second Semester

- 3 - ANTH 201 Introduction to Anthropology or
3 - GEOG 101 Introduction to Geography
 - 3 - BIOL 220 Biology: Concepts, Issues, Values
 - 3 - ENGL 103 Accelerated Composition
 - 1 - PRTM 200 Profession and Practice in PRTM
 - 5 - Elective
- 15

Sophomore Year

First Semester

- 3 - COMM 150 Intro. to Human Comm. or
3 - COMM 250 Public Speaking
 - 2 - PRTM 220 Conceptual Foundations of Parks,
Recreation, and Tourism
 - 3 - Arts and Humanities (Literature) Requirement²
 - 3 - Arts and Humanities (Non-Lit.) Requirement³
 - 6 - Elective
- 17

Second Semester

- 1 - PRTM 198 Creative Inquiry—PRTM I
 - 2 - PRTM 221 Delivery Systems for Parks,
Recreation, and Tourism
 - 3 - PRTM 222 Program and Event Planning in
Parks, Recreation, and Tourism
 - 4 - PRTM 223 Administration/Management in
Parks, Recreation, and Tourism
 - 2 - PRTM 224 Legal Aspects of Parks, Recreation,
and Tourism
- 12

Summer

- 1 - PRTM 206 Practicum I
 - 1 - PRTM 207 Practicum II
- 2

Junior Year

First Semester

- 2 - PRTM 298 Creative Inquiry—PRTM II
 - 12 - Concentration Requirement⁴
- 14

Second Semester

- 2 - PRTM 398 Creative Inquiry—PRTM III
 - 1 - PRTM 404 Field Training I
 - 12 - Concentration Requirement⁴
- 15

Summer

- 6 - PRTM 405 Field Training II

Senior Year

First Semester

- 1 - PRTM 498 Creative Inquiry—PRTM IV
 - 12 - Concentration Requirement⁴
- 13

Second Semester

- 12 - Concentration Requirement⁴
- 12

121 Total Semester Hours

¹EX ST 222, 301, or MTHSC 203

²See General Education Requirements.

³A H 210, MUSIC 210, REL 101, or 102

⁴See advisor.

PROFESSIONAL GOLF MANAGEMENT CONCENTRATION

The Professional Golf Management (PGM) Concentration provides a unique educational background for students who desire to become PGA professionals. Students obtain specialized knowledge and skills which prepare them to become leaders in the golf industry. The PGM Concentration combines academics, career training, and extensive internship experience to develop well-rounded, service-oriented professionals who can meet and respond to the personal as well as business management requirements of golf programs and facilities.

Freshman Year

First Semester

- 1 - BIOL 120 Biological Inquiry Lab. and
 - 3 - BIOL 121 Keys to Human Identity or
 - 3 - BIOL 122 Keys to Biodiversity or
 - 3 - BIOL 123 Keys to Human Biology or
 - 3 - BIOL 124 Keys to Reproduction
 - 3 - PRTM 281 Introduction to Golf Management
 - 3 - PSYCH 201 Introduction to Psychology
 - 3 - Mathematics Requirement¹
 - 3 - Elective
- 16

Second Semester

- 3 - BIOL 220 Biology: Concepts, Issues, Values
 - 3 - ECON 211 Principles of Microeconomics
 - 3 - ENGL 103 Accelerated Composition
 - 1 - PRTM 195 PGM Seminar I
 - 1 - PRTM 200 Profession and Practice in PRTM
 - 3 - PRTM 282 Principles of Golfer Development
 - 3 - Elective
- 17

Summer

- 0 - CO-OP 101 Cooperative Education
 - 1 - PRTM 206 Practicum I
- 1

Sophomore Year

First Semester

- 3 - ACCT 201 Financial Accounting Concepts
 - 3 - COMM 150 Intro. to Human Comm. or
 - 3 - COMM 250 Public Speaking
 - 3 - ECON 212 Principles of Macroeconomics
 - 2 - PRTM 220 Conceptual Foundations of Parks, Recreation, and Tourism
 - 1 - PRTM 295 PGM Seminar II
 - 3 - Arts and Humanities (Literature) Requirement²
 - 3 - Arts and Humanities (Non-Lit.) Requirement³
- 18

Second Semester

- 2 - PRTM 221 Delivery Systems for Parks, Recreation, and Tourism
 - 3 - PRTM 222 Program and Event Planning in Parks, Recreation, and Tourism
 - 4 - PRTM 223 Administration/Management in Parks, Recreation, and Tourism
 - 2 - PRTM 224 Legal Aspects of Parks, Recreation, and Tourism
 - 3 - PRTM 383 Golf Shop Operations
- 14

Summer

- 0 - CO-OP 102 Cooperative Education
 - 1 - PRTM 207 Practicum II
- 1

Junior Year

First Semester

- 0 - CO-OP 103 Cooperative Education

Second Semester

- 3 - ACCT 202 Managerial Accounting Concepts
 - 3 - HORT 212 Introduction to Turfgrass Culture
 - 1 - HORT 213 Turfgrass Culture Lab.
 - 3 - MGT 201 Principles of Management
 - 5 - Elective
- 15

Senior Year

First Semester

- 3 - FD SC 307 Restaurant Food Service Mgt.
 - 3 - FIN 306 Corporation Finance
 - 3 - LAW 322 Legal Environment of Business
 - 3 - MKT 301 Principles of Marketing
 - 3 - PRTM 344 Tourism Markets and Supply
 - 1 - PRTM 395 PGM Seminar III
- 16

Second Semester

- 0 - CO-OP 104 Cooperative Education
 - 6 - PRTM 405 Field Training II
- 6

Summer

- 0 - CO-OP 105 Cooperative Education

Fifth Year

First Semester

- 3 - PRTM 483 Golf Club Mgt. and Operations
 - 1 - PRTM 495 PGM Seminar IV
 - 12 - Departmental Requirement⁴
- 16

120 Total Semester Hours

¹EX ST 222, 301, or MTHSC 203

²See General Education Requirements.

³A A H 210, MUSIC 210, REL 101, or 102

⁴See advisor.

THERAPEUTIC RECREATION CONCENTRATION

The Therapeutic Recreation (TR) Concentration prepares students for exciting careers working with people with disabilities in a variety of settings, including community-based recreation agencies, camps, children's hospitals, psychiatric and physical rehabilitation hospitals, and assisted-living facilities, to name a few. Therapeutic Recreation consists of the delivery of recreation services designed to enhance participants leisure experiences, quality of life, and functional capabilities. Students who complete these requirements will be eligible to sit for an examination to become a Certified Therapeutic Recreation Specialist (CTRS).

Freshman Year

First Semester

- 1 - BIOL 120 Biological Inquiry Lab. and
 - 3 - BIOL 121 Keys to Human Identity or
 - 3 - BIOL 122 Keys to Biodiversity or
 - 3 - BIOL 123 Keys to Human Biology or
 - 3 - BIOL 124 Keys to Reproduction
 - 2 - C U 101 University Success Skills
 - 3 - PSYCH 201 Introduction to Psychology
 - 3 - Mathematics Requirement¹
 - 3 - Elective
- 15

Second Semester

- 3 - BIOL 220 Biology: Concepts, Issues, Values
 - 3 - ENGL 103 Accelerated Composition
 - 1 - PRTM 200 Profession and Practice in PRTM
 - 3 - SOC 201 Introduction to Sociology
 - 5 - Elective
- 15

Sophomore Year

First Semester

- 3 - COMM 150 Intro. to Human Comm. or
 - 3 - COMM 250 Public Speaking
 - 2 - PRTM 220 Conceptual Foundations of Parks, Recreation, and Tourism
 - 3 - Arts and Humanities (Literature) Requirement²
 - 3 - Arts and Humanities (Non-Lit.) Requirement³
 - 6 - Elective
- 17

Second Semester

- 1 - PRTM 198 Creative Inquiry—PRTM I
 - 2 - PRTM 221 Delivery Systems for Parks, Recreation, and Tourism
 - 3 - PRTM 222 Program and Event Planning in Parks, Recreation, and Tourism
 - 4 - PRTM 223 Administration/Management in Parks, Recreation, and Tourism
 - 2 - PRTM 224 Legal Aspects of Parks, Recreation, and Tourism
- 12

Summer

- 1 - PRTM 206 Practicum I
 - 1 - PRTM 207 Practicum II
- 2

Junior Year

First Semester

- 2 - PRTM 298 Creative Inquiry—PRTM II
 - 12 - Concentration Requirement⁴
- 14

Second Semester

- 2 - PRTM 398 Creative Inquiry—PRTM III
 - 1 - PRTM 404 Field Training I
 - 12 - Concentration Requirement⁴
- 15

Summer

- 6 - PRTM 405 Field Training II

Senior Year**First Semester**

- 1 - PRTM 498 Creative Inquiry—PRTM IV
- 12 - Concentration Requirement⁴
- 13

Second Semester

- 12 - Concentration Requirement⁴
- 12

121 Total Semester Hours

¹EX ST 222, 301, or MTHSC 203²See General Education Requirements.³A A H 210, MUSIC 210, REL 101, or 102⁴See advisor.**TRAVEL AND TOURISM
CONCENTRATION**

The Travel and Tourism (T&T) Concentration prepares students for interesting and challenging careers working in one of the world's most diverse and dynamic industries. Students in this concentration are introduced to issues pertaining to the management, planning, and promotion of places and events such as tourist attractions. The program is designed to provide an understanding of the linkages that exist between local communities, their populations, and various public, private, and special interest groups. Students in Travel and Tourism can pursue careers in private sector enterprises, government agencies, convention and visitor bureaus, as well as other tourism-affiliated organizations.

Freshman Year**First Semester**

- 2 - C U 101 University Success Skills
- 3 - GEOG 103 World Regional Geography
- 3 - Mathematics Requirement¹
- 4 - Natural Science Requirement²
- 3 - Elective
- 15

Second Semester

- 3 - ECON 211 Principles of Microeconomics
- 3 - ENGL 103 Accelerated Composition
- 1 - PRTM 200 Profession and Practice in PRTM
- 3 - Mathematics or Natural Science Requirement²
- 5 - Elective
- 15

Sophomore Year**First Semester**

- 3 - COMM 150 Intro. to Human Comm. or
3 - COMM 250 Public Speaking
- 2 - PRTM 220 Conceptual Foundations of Parks,
Recreation, and Tourism
- 3 - Arts and Humanities (Literature) Requirement²
- 3 - Arts and Humanities (Non-Lit.) Requirement³
- 6 - Elective
- 17

Second Semester

- 1 - PRTM 198 Creative Inquiry—PRTM I
- 2 - PRTM 221 Delivery Systems for Parks,
Recreation, and Tourism
- 3 - PRTM 222 Program and Event Planning in
Parks, Recreation, and Tourism
- 4 - PRTM 223 Administration/Management in
Parks, Recreation, and Tourism
- 2 - PRTM 224 Legal Aspects of Parks, Recreation,
and Tourism
- 12

Summer

- 1 - PRTM 206 Practicum I
- 1 - PRTM 207 Practicum II
- 2

Junior Year**First Semester**

- 2 - PRTM 298 Creative Inquiry—PRTM II
- 12 - Concentration Requirement⁴
- 14

Second Semester

- 2 - PRTM 398 Creative Inquiry—PRTM III
- 1 - PRTM 404 Field Training I
- 12 - Concentration Requirement⁴
- 15

Summer

- 6 - PRTM 405 Field Training II

Senior Year**First Semester**

- 1 - PRTM 498 Creative Inquiry—PRTM IV
- 12 - Concentration Requirement⁴
- 13

Second Semester

- 12 - Concentration Requirement⁴
- 12

121 Total Semester Hours

¹EX ST 222, 301, or MTHSC 203²See General Education Requirements.³A A H 210, MUSIC 210, REL 101, or 102⁴See advisor.

MINORS

Following are minors acceptable for students in the College of Health, Education and Human Development. Students cannot major and minor in the same field or acquire a minor that is not allowed by the degree program.

Accounting	Management
Adult/Extension Education	Management Information Systems
Aerospace Studies	Mathematical Sciences— <i>not open to Mathematics Teaching or Secondary Education—Mathematics majors</i>
Agricultural Business Management	Microbiology
Agricultural Mechanization and Business	Military Leadership
American Sign Language Studies	Modern Languages— <i>not open to Secondary Education—Modern Languages majors</i>
Animal and Veterinary Sciences	Music
Anthropology	Natural Resource Economics
Architecture	Nonprofit Leadership
Athletic Leadership	Packaging Science
Biochemistry	Pan African Studies
Biological Sciences— <i>not open to Science Teaching—Biological Sciences or Secondary Education—Biological Sciences majors</i>	Park and Protected Area Management
Business Administration	Philosophy
Chemistry	Physics— <i>not open to Science Teaching—Physical Sciences majors</i>
Cluster	Plant Pathology
Communication Studies	Political Science— <i>not open to Secondary Education: Social Studies (Political Science) majors</i>
Computer Science	Psychology— <i>not open to Secondary Education: Social Studies (Psychology) majors</i>
Crop and Soil Environmental Science	Public Policy
East Asian Studies	Religion
Economics— <i>not open to Secondary Education: Social Studies (Economics) majors</i>	Russian Area Studies
Education	Science and Technology in Society
English	Screenwriting
Entomology	Sociology— <i>not open to Secondary Education: Social Studies (Sociology) majors</i>
Entrepreneurship	Spanish-American Area Studies
Environmental Engineering	Theatre
Environmental Science and Policy	Therapeutic Recreation
Equine Business	Travel and Tourism
Film Studies	Turfgrass
Financial Management	Urban Forestry
Food Science	Wildlife and Fisheries Biology
Forest Products	Women's Studies
Forest Resource Management	Writing
Genetics	
Geography	
Geology	
Global Politics	
Great Works	
History— <i>not open to Secondary Education: Social Studies (History) majors</i>	
Horticulture	
International Engineering and Science	
Legal Studies	

See pages 36–39 for details.

COURSES OF INSTRUCTION

This list includes for each course the catalog number, title, credit hours, class and laboratory hours per week, description, and prerequisites. Courses numbered 600 and above are graduate courses.

Cross-Listed Courses

A cross-listed course is one that can be taken for credit under different departmental titles. For example, students can take SOC (R S) 471 *Demography* as either R S 471 or SOC 471. The student should select the desired departmental title in conference with an advisor. The departmental title may be changed only during the period allowed by the University calendar for adding a course.

COURSE ABBREVIATIONS

Accounting.....	ACCT
Aerospace Studies	A S
Agricultural Education	AG ED
Agricultural Mechanization	AG M
Agriculture	AGRIC
Agriculture, Forestry and Life Sciences	AFLS
American Sign Language	A S L
Animal and Veterinary Sciences.....	AVS
Animal Physiology	AN PH
Anthropology.....	ANTH
Applied Economics.....	AP EC
Arabic.....	ARAB
Architecture	ARCH
Art	ART
Art and Architectural History	A A H
Astronomy.....	ASTR
Athletic Leadership.....	A L
Automotive Engineering.....	AU E
Biochemistry	BIOCH
Bioengineering.....	BIO E
Biological Sciences.....	BIOSC
Biology	BIOL
Biomolecular Engineering.....	BMOLE
Biosystems Engineering	B E
Biosystems Technology	B T
Business.....	BUS
Business Administration.....	M B A
Career and Technology Education	CTE
Ceramic and Materials Engineering.....	C M E
Chemical Engineering.....	CH E
Chemistry.....	CH
Chinese	CHIN
City and Regional Planning.....	C R P
Civil Engineering	C E
Clemson University	C U
College of Architecture, Arts and Humanities.....	CAAH
College of Engineering and Science.....	CES
Communication Studies.....	COMM
Community and Rural Development.....	C R D
Computer Science.....	CP SC
Construction Science and Management.....	C S M
Crop and Soil Environmental Science.....	CSENV
Dance	DANCE
Design Studies	DSIGN
Early Childhood Education	ED EC
East Asian Studies.....	E A S

Economics.....	ECON
Education.....	ED
Educational Counseling	ED C
Educational Foundations	ED F
Educational Leadership	ED L
Electrical and Computer Engineering.....	E C E
Elementary Education	ED EL
Engineering.....	ENGR
Engineering Graphics	E G
Engineering Mechanics.....	E M
English	ENGL
Entomology.....	ENT
Environmental and Natural Resources	E N R
Environmental Design and Planning	EDP
Environmental Engineering and Science.....	EE&S
Environmental Science and Policy	EN SP
Environmental Toxicology.....	ENTOX
Executive Leadership and Entrepreneurship.....	E L E
Experimental Statistics	EX ST
Finance.....	FIN
Food Science	FD SC
Food Technology.....	FD TH
Forestry	FOR
Forestry and Natural Resources.....	F N R
French	FR
Genetics	GEN
Geography.....	GEOG
Geology	GEOL
German	GER
Graduate Studies	G S
Graphic Communications.....	G C
Great Works.....	G W
Health	HLTH
Health, Education and Human Development.....	HEHD
Historic Preservation	H P
History	HIST
Honors	HON
Horticulture	HORT
Human Resource Development	H R D
Humanities	HUM
Industrial Engineering.....	I E
Integrated Pest Management	I P M
International Studies	I S
Italian	ITAL
Japanese.....	JAPN
Landscape Architecture	LARCH
Language	LANG
Language and International Health	L&IH
Language and International Trade	L&IT
Latin.....	LATIN
Law.....	LAW
Leisure Skills	L S
Library.....	LIB
Management	MGT
Marketing.....	MKT
Materials Science and Engineering	MS&E
Mathematical Sciences.....	MTHSC
Mechanical Engineering	M E
Microbiology	MICRO
Military Leadership.....	M L
Music.....	MUSIC
Nonprofit Leadership	NPL
Nursing	NURS
Nutrition	NUTR
Packaging Science	PKGSC
Pan African Studies	P A S
Parks, Recreation and Tourism Management.....	PRTM

Performing Arts	P A
Philosophy.....	PHIL
Physical Science.....	PH SC
Physics	PHYS
Plant and Environmental Sciences.....	PES
Plant Pathology	PL PA
Plant Physiology	PL PH
Policy Studies	PO ST
Political Science	PO SC
Polymer and Fiber Chemistry.....	PFC
Portuguese.....	PORT
Psychology	PSYCH
Public Administration	P ADM
Reading	READ
Real Estate Development.....	RED
Religion	REL
Rhetorics, Communication and Information Design	RCID
Rural Sociology	R S
Russian	RUSS
Science and Technology in Society.....	S T S
Secondary Education	EDSEC
Sociology	SOC
Soils and Sustainable Crop Systems	SSCS
Spanish	SPAN
Special Education	ED SP
Textiles	TEXT
Theatre	THEA
Vocational-Technical Education	VT ED
Wildlife and Fisheries Biology.....	W F B
Women's Studies	W S

ACCOUNTING

Professors: L. S. Cash, T. L. Dickens, D. M. Guffey, J. J. McMillan, R. E. Welton Jr., *Director*; A. J. Winters; Associate Professors: L. S. Clark, R. B. Dull, F. A. Kennedy, L. F. Schleifer; Assistant Professors: C. W. Hollingsworth, L. A. Owens-Jackson, J. D. Stanley; Lecturers: J. R. Madray, M. A. Prater

ACCT 201, H201 Financial Accounting Concepts 3(3,0) Introduction to accounting principles with emphasis on the use of financial data and analysis of financial statements.

ACCT 202, H202 Managerial Accounting Concepts 3(3,0) Introduction to managerial accounting with emphasis on using accounting information to make decisions.

ACCT 204 Accounting Procedures I(1,2) Lectures, demonstrations, and hands-on experience with accounting systems and analysis required to complete the accounting cycle and prepare financial statements. Intended for students who plan to enroll in ACCT 303 or 311.

ACCT 299 Creative Inquiry—Accounting 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits. To be taken Pass/Fail only.

ACCT 303, H303 Cost Accounting 3(3,0) Application of cost analysis to manufacturing and distributing problems; analysis of behavior characteristics of business costs and a study of principles involved in standard cost systems; lectures and problems. *Prq:* ACCT 201 and 204 with a C or better.

ACCT 307 Managerial Accounting 3(3,0) Emphasizes internal use of accounting data by the manager in establishing plans and objectives, controlling operations, and making decisions involved with management of an enterprise. May not be taken for credit by Accounting majors. *Preq:* ACCT 202.

ACCT 311, H311 Intermediate Financial Accounting I 3(3,0) In-depth treatment of traditional financial accounting topics of standards setting, financial statement form and content, and accounting and reporting of current assets. Emphasizes basic theory, valuation, and measurement, as well as presentation and analysis of accounting information. *Preq:* ACCT 201 and 204 with a C or better.

ACCT 312, H312 Intermediate Financial Accounting II 3(3,0) Continuation of ACCT 311. In-depth treatment of accounting and reporting for noncurrent assets, current and noncurrent liabilities, and equity. Emphasizes basic theory, valuation, and measurement issues, as well as presentation and analysis of accounting information. *Preq:* ACCT 311 with a C or better.

ACCT 313, H313 Intermediate Financial Accounting III 3(3,0) Continuation of ACCT 312. In-depth treatment of selected accounting topics, such as investments, cash flows, tax allocation, post-retirement benefits, leases, and error corrections. Emphasizes basic theory, valuation, and measurement, as well as presentation and analysis of accounting information. *Preq:* ACCT 312 with a C or better.

ACCT 322 Accounting Information Systems 3(3,0) Study of computer-based accounting systems with attention to systems design, application, internal control, auditing the system, and system security. *Preq:* CP SC 220.

ACCT 340 Internal Auditing Theory 3(3,0) Introduces students to internal auditing and covers internal auditing standards, ethics, concepts, audit techniques, and reporting practices. Enrollment priority will be given to students who have completed 60, but not more than 100, credits. *Preq:* ACCT 311 with a C or better.

ACCT 391 Public Accounting Certificate Program I 0 Professional interaction in public accounting. Tracks interaction requirements of the Public Accounting Certificate Program. To be taken Pass/Fail only. *Preq:* Junior standing.

ACCT 393 Managerial Accounting Certificate Program I 0 Professional interaction in managerial accounting. Tracks interaction requirements for the Managerial Accounting Certificate Program. To be taken Pass/Fail only. *Preq:* Junior Standing.

ACCT 395 Internal Auditing Certificate Program I 0 Professional interaction in internal auditing. Tracks interaction requirements of the Internal Auditing Certificate Program. To be taken Pass/Fail only.

ACCT 399 Internship in Accounting 1-3(1-3,0) Faculty-supervised accounting internship designed to give students learning opportunities that support their classroom experiences. Requires a minimum of six full-time weeks. Course enrollment and internship must occur in the same semester. Simultaneous credit cannot be received for another internship offering. May be repeated for a maximum of three credits. To be taken Pass/Fail only. *Preq:* Junior standing and consent of instructor.

ACCT 404, H404, 604 Individual Taxation 3(3,0) Interpretation of Federal income tax laws, regulations, and court decisions with practice in application of these laws to the returns of individuals, partnerships, and corporations. *Preq:* ACCT 311 with a C or better.

ACCT 406 Business Taxation 3(3,0) Introduction to the importance of taxation in business decision making. Emphasizes the interrelationship of taxes, the choice of business form, and various business transactions; exposes students to the breadth of business decisions which are affected by the Federal Income Tax. *Preq:* ACCT 311 with a C or better.

ACCT 408 Retirement and Estate Planning 3(3,0) Provides students with an understanding of the tax consequences of personal financial, retirement, and estate planning. Subjects include the basic concepts of retirement, gift, income shifting, and estate planning. *Preq:* ACCT 404 with a C or better.

ACCT 410, 610 Budgeting and Executive Control 3(3,0) Study and application of selected techniques used in the planning and control functions of business organizations. *Preq:* ACCT 303 with a C or better.

ACCT 415 Auditing 3(3,0) Study of professional and practical auditing theory. Includes a review of internal controls, audit procedures, and development of audit programs for various types of businesses. Considers auditors' professional and ethical standards. *Preq:* ACCT 311 and 322 with a C or better.

ACCT 445 Internal Auditing Practice 3(3,0) Expands students' knowledge of internal auditing practice, including operation audits, organization audits, quality-control audits, and organization theory. *Preq:* ACCT 340 with a C or better.

ACCT 491 Public Accounting Certificate Program II 0 Public accounting service. Tracks service requirement of the Public Accounting Certificate Program. To be taken Pass/Fail only. *Preq:* Senior standing.

ACCT 493 Managerial Accounting Certificate Program II 0 Managerial accounting service. Tracks service requirement of the Managerial Accounting Certificate Program. To be taken Pass/Fail only. *Preq:* Senior standing.

ACCT 495 Internal Auditing Certificate Program II 0 Internal auditing service. Tracks service requirement of the Internal Auditing Certificate Program. To be taken Pass/Fail only.

AEROSPACE STUDIES

Professor: M. R. Mendonca, *Chair*; *Assistant Professors:* M. F. Brabham, T. R. Butler, M. Giebner

A S 109 Air Force Today I 2(1,2) Deals with Air Force in the contemporary world through a study of the total force structure: strategic offensive and defensive, general purpose, and aerospace support. Leadership laboratory activities include drill fundamentals, customs, and courtesies of the service.

A S 110 Air Force Today II 2(1,2) Continuation of A S 109. Leadership laboratory includes drill, ceremonies, and an introduction to Air Force career opportunities.

A S 209 Development of Air Power I 2(1,2) Study of the development of air power from balloons and dirigibles through the peaceful employment of U.S. air power in relief missions and civic action programs in the late 1960s and also the air war in Southeast Asia. Leadership laboratory provides experience in guiding, directing, and controlling an Air Force unit.

A S 210 Development of Air Power II 2(1,2) Continuation of A S 209.

A S 308 Air Force Leadership and Management 3(3,0) Motivational and behavioral processes, leadership, communication, and group dynamics are covered to provide a foundation for development of the leader's professional skills using Air Force examples and methods.

A S 309 Air Force Leadership and Management I 4(3,2) Emphasizes the individual as a manager. Individual motivational and behavioral processes, leadership, communication, and group dynamics are covered to provide a foundation for the development of the Air Force officer's professional skills. Students prepare individual and group presentations, write reports, participate in group discussions, seminars, and conferences.

A S 310 Air Force Leadership and Management II 4(3,2) Continuation of A S 309. Uses the basic managerial processes involving decision making, utilization of analytical aids in planning, organizing, and controlling environment. Actual case studies are used to enhance learning and communication processes.

A S 409 National Security Policy I 4(3,2) Analysis of the role and function of the military officer in a democratic society and the relationships involved in civil-military interactions. Students prepare individual and group presentations, write reports, and participate in group discussions.

A S 410 National Security Policy II 4(3,2) Continuation of A S 409. Examines the environmental context in which U.S. defense policy is formulated and implemented. Emphasizes initial commissioned service and military justice. Students prepare individual and group presentations for the class, write reports, and participate in group discussions, seminars, and conferences.

AGRICULTURAL EDUCATION

Professors: T. R. Dobbins, D. R. King, C. D. White Sr.; *Associate Professor:* P. M. Fravel

AG ED 100 Orientation and Field Experience 1(0,2) Supervised observations and explanations of vocational agriculture teaching while serving as teacher aides. One full week of field experience in representative high schools is required.

AG ED 102 Agricultural Education Freshman Seminar 1(2,0) Introduces students to the South Carolina agriculture education structure and provides opportunities to prepare oral presentations on selected agricultural education organizations. Assists students in understanding the value of professional organizations to agriculture education in the state and nation. *Preq:* Agricultural Education major.

AG ED 103 Multiculturalism in Agricultural Education 3(3,0) Studies the influence of various groups and their contributions to agriculture. Includes the roles of women, African-, Hispanic-, Asian-, Native-, and European-Americans.

AG ED 200 Agricultural Applications of Educational Technology 3(2,2) Overview of microcomputer hardware and software encompassing word processing, spreadsheet, utility, Web development, and graphic communications in an agricultural context.

AG ED 201 Introduction to Agricultural Education 3(2,3) Principles of education, development of agricultural education, and an introduction to the formulation of instructional programs for the teaching of agricultural courses.

AG ED 202 Agricultural Education Sophomore Seminar 1(2,0) Instruction on how to establish a comprehensive student record-keeping system. Includes integration of that data into the FFA Awards program. Allows students hands-on experience with the total FFA Awards program on the state and national level. *Preq:* AG ED 102.

AG ED 203 Teaching Agriscience 3(2,3) Integrates biological and technological concepts appropriate for teaching introductory middle or secondary school-level courses in agricultural science. Topics emphasize disciplines, theories, and applications in modern agricultural production. Experiences include teaching techniques, materials, resources, and the design and implementation of new activities to facilitate teaching agriscience. *Preq:* BIOL 104/106.

AG ED 204 Applied Agriculture Calculations 3(3,0) Demonstrates basic mathematical applications in crop and livestock production and agribusiness and financial management. These applications aid students in understanding the mathematical applications needed in the agriculture field.

AG ED 302 Agricultural Education Junior Seminar 1(2,0) Allows students the opportunity to prepare and deliver information on Career Development Events (CDE) and to understand fully the CDE concepts. Students receive much needed hands-on experience at the state and national levels. *Preq:* AG ED 202.

AG ED 303 Mechanical Technology for Agriculture Education 3(2,3) Study of technical content and new technology utilized in agriculture mechanics. Integrates agriculture mechanics topics such as electrical wiring and controls, green industry maintenance, irrigation systems, and agriculture construction. Offers a delivery of mechanics instruction in the classroom and laboratory setting.

AG ED 355 Team and Organizational Leadership in the Food and Fiber System 3(3,0) Principles and practices in planning, developing, conducting, and evaluating leadership programs for agricultural groups. Focuses on helping students better understand themselves and others; improving group communications; becoming effective leaders and members of groups; improving leadership and personal development skills; assessing leadership situations, determining and administering appropriate leadership strategies.

AG ED 400 Supervised Field Experience II 1(0,3) Special emphasis is placed on enhancing existing knowledge and experiences of the students. Primary focus is on becoming acquainted with the student teaching center well in advance of the customary twelve-week directed teaching experience.

AG ED 401, 601 Instructional Methods in Agricultural Education 3(2,3) Appropriate methods of teaching vocational agriculture in high schools. Includes procedures for organizing teaching programs, teaching high school students, and directing FFA activities.

AG ED 402 Agricultural Education Senior Seminar 1(2,0) Provides an opportunity to prepare and deliver information on continuing adult education. Assists students in fully understanding the adult education component of the total Secondary Agriculture Education Program. *Preq:* AG ED 302.

AG ED 403, 603 Principles of Adult/Extension Education 3(3,0) Overview of adult/extension education and adult learning. Selection of adult education providers is reviewed with emphasis on extension. *Preq:* Junior standing or consent of instructor.

AG ED 404 Biotechnology in Agricultural Education 3(2,3) Multidisciplinary introduction to theories and applications of biotechnology in agriculture and high school agricultural education. Topics include common techniques used in modern biotechnology, examples of their applications, and social considerations that impact the use of biotechnology in agricultural research and development. Laboratories illustrate principles covered in lecture. *Preq:* BIOL 104/106.

AG ED 406 Directed Teaching 12(0,36) Guided participation in the professional responsibilities of a teacher of vocational agriculture, including intensive study of the problems encountered and competencies developed. Twelve weeks of directed teaching in selected schools are required. *Preq:* AG ED 400, 401.

AG ED 407 Internship in Extension and Leadership Education 6-12(0,18-36) Internship placements may include county extension offices and other appropriate extension units. Six weeks of supervised experience must be completed for six hours of credit. Twelve weeks of supervised experience must be completed for 12 hours of credit. May be repeated for a maximum of 12 credits. *Preq:* AG ED 400, 401, Senior standing, and consent of instructor.

AG ED 409, 609 Agriscience Institute: Applications of Agriscience to the Secondary Curriculum 3(2,2) Designed for pre-service and in-service agricultural educators or secondary-level counselors. Surveys current developments in agriscience with an emphasis on modern practices, current job opportunities, and meeting state and national science and math education standards through agricultural instruction. Students construct lesson plans and career planning modules for high school. *Preq:* AG ED 102.

AG ED 412 Senior Agriculture Leadership Seminar 1(1,0) Emphasizes leadership techniques and policies that affect agriculture. Students conduct research and make presentations on issues which influence agriculture policy. *Preq:* AP EC 202, 302.

AG ED 415, 615 Leadership of Volunteers 3(3,0) Provides an overview of volunteer management. Examines the knowledge, skills, and abilities required of professional managers to involve volunteers effectively in the work of organizations.

AG ED 416, 616 Ethics and Issues in Agriculture and the Food and Fiber System 3(3,0) Explores ethical theories, concepts of critical thinking, and major ethical issues in American agriculture. The major social, political, economic, and ethical issues that arise in connection to the "food and fiber system" are examined and potential solutions considered.

AG ED 423, 623 Curriculum 2(2,0) Curriculum goals and related planning for career and continuing education programs.

AG ED 425, 625 Teaching Agricultural Mechanics 2(1,3) Instruction in organizing course content, conducting and managing an agricultural mechanics laboratory, shop safety, microteaching demonstrations of psychomotor skills, and methods of teaching manipulative abilities.

AG ED 428, 628 Special Studies in Agricultural Education 1-3(1-3,0) Students study, individually or collectively, selected topics and/or problems in agricultural education to meet the particular needs of the clientele enrolled. May be repeated for a maximum of six credits.

AG ED 440, 640 Program Development in Adult/Extension Education 3(3,0) Principles, theory, and practice in planning and conducting educational programs in adult/extension settings. *Preq:* Junior standing or consent of instructor.

AG ED 450 Modern Topics and Issues 3(3,0) Students select a major area of concern to teachers of agriculture and county agents for intensive study at least one semester prior to offering the course. Team teaching with faculty from other departments in the College of Agriculture, Forestry and Life Sciences is utilized when feasible. *Preq:* Senior standing or relevant experience.

AG ED (CTE, ED F) 480, 680 Digital Technology in the 21st Century Classroom 3(2,2) See ED F 480.

AG ED (CTE, ED F) 482, 682 Advanced Educational Applications of Microcomputers 3(2,2) See ED F 482.

AGRICULTURAL MECHANIZATION

Professors: J. P. Chastain, Y.J. Han, *Interim Chair*; J. C. Hayes, A. Khalilian; *Associate Professors:* H. J. Farahani, T. O. Owino; *Assistant Professors:* A. T. Chow, D. R. Hitchcock, A. Jayakaran, C. V. Privette, C. B. Sawyer; *Lecturer:* K.R. Kirk

AG M 101 Introduction to Agricultural Mechanization and Business 1(0,3) Introduces the Agricultural Mechanization and Business program. Gives an overview of the curriculum and explains the opportunities for extracurricular activities. Covers long-term interaction between the department and alumni.

AG M 205 Principles of Fabrication 3(2,3) Principles, techniques, and methods in the selection, proper use, and maintenance of hand and power tools. Principal topics include welding, tool fitting, metalworking, woodworking, finishing and preserving, and heat treatment.

AG M 206 Machinery Management 3(2,3) Teaches agriculture students to apply physical principles and sound reasoning to the mechanization of modern agricultural production and processing enterprises. Stresses planning efficient operational systems and wise selection of equipment, based on function and economic suitability. *Preq:* MTHSC 105, PHYS 207 or consent of instructor.

AG M 221 Surveying: Earthwork and Area Measurements 3(2,3) Fundamentals of surveying relative to earthwork and land area measurements, including linear measurements, leveling, angular measurements, and computations. Levels and total stations are used with an introduction to GPS. *Preq:* MTHSC 102 or 106 or consent of instructor.

AG M 301 Soil and Water Conservation 3(3,0) Soil and water management is studied by applying principles of mathematics, fluid flow, hydrology, and soil characteristics as related to soil-water-vegetation complexes in runoff, erosion control, channel design, water conservation, drainage, irrigation, stormwater best management practices and stream restoration.

AG M 303 Calculations for Mechanized Agriculture 3(2,3) Enhances students' ability to analyze and solve a wide range of problems requiring engineering technology. Laboratory periods introduce students to microcomputer hardware. Basic programming and typical applications to agricultural mechanization problems are included. *Preq:* PHYS 200, 207, or consent of instructor.

AG M 371 Agricultural Mechanization Practicum 1-3 Preplanned internship with an approved employer involved in agricultural technical or business endeavors. A minimum 130 hours of supervised responsibility are required per credit hour. A work journal, written/oral reports, company consent and evaluation must be on file. May be repeated for a maximum of six credits. To be taken Pass/Fail only. *Preq:* Sophomore standing and consent of department.

AG M 402, 602 Landscape Drainage and Irrigation 3(2,3) Uses basic soil-water-plant relationships to determine the need for and methods of irrigation and drainage. Topics include irrigation methods, drainage needs and drainage methods.

AG M 405, 605 Agricultural Structures and Environmental Control 3(2,3) Technical considerations of buildings used for agriculture emphasizing structural materials, structural adequacy, environmental control, and indoor air quality. *Preq:* AG M 221, 303, PHYS 200.

AG M 406, 606 Mechanical and Hydraulic Systems 3(2,3) Study of power transmission systems for agricultural production emphasizing mobile equipment. Characteristics, requirements, and design of both V-belt drive and roller-chain drives are presented. Emphasizes hydraulic power transmission systems, including pumps, actuators, control devices, and hydraulic circuitry. *Preq:* AG M 206, PHYS 200 or 207, or consent of instructor.

AG M 410, 610 Precision Agriculture Technology 3(2,3) Includes principles and hands-on application of technologies supporting precision agriculture. Topics include global positioning system (GPS), geographic information system software, variable rate technologies, collection of spatial data, automated guidance of equipment, spatial data mapping and analysis, remote sensing, and economic considerations. *Preq:* Junior standing.

AG M 452, 652 Mobile Power 3(2,3) Study of tractors, emphasizing internal combustion engines and support systems necessary for their proper functioning. Also considers application of power, maintenance, adjustment, and general repair. *Preq:* PHYS 200, 207, or consent of instructor.

AG M 460, 660 Electrical Systems 3(2,3) Students in agriculture and related curricula study electric and other utilities on the farm and in the home. Emphasizes selection, installation, and maintenance of wiring systems, lighting systems, motors, controls, water systems, and waste disposal systems. *Preq:* Junior standing.

AG M 472 Capstone 3(2,3) Covers professional conduct, ethics, oral and written communication, and financial matters. Each student completes a comprehensive project on a technical subject. The results are given in a written report and oral presentation. Students use digital portfolio technology to assess their education.

AG M 473 Special Topics in Agricultural Mechanization 1-3(1-3,0) Comprehensive study and application of new technologies and methods not covered in existing courses. Emphasizes independent study using innovative approaches to problem solving. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

AGRICULTURE

Professors: L. L. Bauer, D. E. Linvill, V. L. Quisenberry;
Associate Professor: W. C. Stringer

AGRIC 104, H104 Introduction to Plant Sciences 3(3,0) Fundamental course in plant sciences, including agronomic and horticultural crops of the major agricultural areas of the world and emphasizing the crops of South Carolina.

AGRIC (EN SP) 315, H315 Environment and Agriculture 3(3,0) Survey of the interrelationships of the environment and current agriculture and agricultural practices to include both the environmental impacts of agriculture and the role of agriculture in conservation and improving the environment. *Preq:* Sophomore standing and two semesters of biology or chemistry.

AGRIC 355 Team and Organizational Leadership in Food and Fiber System 3(3,0) Principles and practices in planning, developing, conducting, and evaluating leadership programs for agricultural groups. Focuses on helping students better understand themselves and others, improving group communications; becoming effective leaders and members of groups; improving leadership and personal development skills, assessing leadership situations, determining and administering appropriate leadership strategies.

AGRIC 412 Senior Agriculture Leadership Seminar 1(1,0) Emphasizes leadership techniques and policies that affect agriculture. Students conduct research and make presentations on issues which influence agricultural policy. *Preq:* AP EC 202, 302.

AGRIC 416 Ethics and Issues in Agriculture and the Food and Fiber System 3(3,0) Explores ethical theories, concepts of critical thinking, and major ethical issues in American agriculture. Examines the major social, political, economic, and ethical issues that arise in connection to the food and fiber system and considers potential solutions.

AGRIC 440, 640 Microclimatology 3(3,0) Study of energy balance in earth's atmosphere and soil solar and thermal radiation, air and soil temperature, humidity, evaporation and the hydrologic cycle, wind fields. Examines weather variables to describe microclimates and the energy balance of plants, animals, and insects, modification of microclimates; and rural and urban climates. *Preq:* PHYS 240 or equivalent or consent of instructor; second semester Junior standing.

AGRIC H491 Senior Honors Research 3(1,6) Senior division honors research in an agricultural sciences curriculum. In consultation with and under the direction of a professor, students select a research topic, conduct experiments, record data, and make oral presentations of results to the College Honors Program Committee. Open to approved Honors Program students only.

AGRIC H492 Senior Honors Research 3(1,6) Continuation of AGRIC H491. Senior division honors research in an agricultural sciences curriculum. Upon termination of the research project, students submit formal written reports and make final oral presentations of results to the College Honors Program Committee. Professor-student discussions of additional topics are arranged.

AGRICULTURE, FORESTRY AND LIFE SCIENCES

AFLS 191 Directed Research 1-3(0,3-9) Research projects, supervised by faculty in the College of Agriculture, Forestry and Life Sciences introducing research methods. Restricted to outstanding high school students, selected using Governor's School for Science and Mathematics ranking criteria. May be repeated for a maximum of six credits. *Preq:* Entering high school junior or senior status and consent of faculty research supervisor and department in which research is conducted.

AMERICAN SIGN LANGUAGE

Associate Professor: W. A. Brant; *Lecturer:* T. Bateson

ASL 101 American Sign Language I 4(3,1) Introduction to the basics of American Sign Language, its history, and culture. Visual-gestural communication techniques are used.

ASL 102 American Sign Language I 4(3,1) Continuation of ASL 101 and culture to develop further communicative competencies. Proficiency oriented with the use of visual-gestural communication skills. *Preq:* ASL 101 or consent of instructor.

ASL 201 American Sign Language II 3(3,0) Continuation of ASL 102. Covers additional vocabulary, sentences, and grammar structures. Main focus is on conversational and receptive skills as well as a better understanding of Deaf culture. *Preq:* ASL 102 or consent of instructor.

ASL 202 American Sign Language II 3(3,0) Continuation of ASL 201, concentrating on intermediate conversational and discourse skills using American Sign Language, more complex American Sign Language grammar, reading comprehension, and composition of short stories, narratives, and dialogues with an emphasis on topics related to the Deaf community. Class is conducted totally in American Sign Language using visual-gestural communicative techniques. *Preq:* ASL 201 or consent of instructor.

A S L 297 Creative Inquiry—American Sign Language 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Arrangements with faculty members must be established prior to registration.

A S L 301 Advanced American Sign Language I 3(3,0) Focuses on American Sign Language fluency, vocabulary development, grammatical structures of American Sign Language, use of classifiers, conversational skills, translating written texts into American Sign Language, and vice versa. Emphasis is on making formal presentations in American Sign Language. *Preq:* A S L 202 or consent of instructor.

A S L 302 Advanced American Sign Language II 3(3,0) Continuation of A S L 301. Focuses on American Sign Language fluency, vocabulary development, grammatical structures of American Sign Language, use of classifiers, conversational skills, translating written texts into American Sign Language, and vice versa. Emphasis is on making formal presentations in American Sign Language. *Preq:* A S L 301 or consent of instructor.

A S L 304 Internship in American Sign Language 3(0,4) Minimum 60 contact hours in an environment exclusively using American Sign Language. Frequent opportunities to converse with native signers in classroom settings, dormitory settings, meals, excursions, sporting events, cultural events, and meetings. *Preq:* A S L 202 or consent of instructor.

A S L 305 Deaf Studies in the United States 3(3,0) In-depth look into language, culture, and daily lives of approximately one million people who use American Sign Language as their primary language. Traces the roots of American Sign Language from pre-revolutionary times to current science and knowledge and how it applies to professional fields. *Preq:* A S L 202 or consent of instructor.

A S L 349 Advanced Applications in American Sign Language 3(3,0) Study of select signs in American Sign Language emphasizing culturally appropriate signs in education, psychology/mental health, legal/legislation, health/medicine, religion, drugs/alcohol, and technology. May be repeated for a maximum of six credits. *Preq:* A S L 202 or consent of instructor.

A S L 397 Creative Inquiry—American Sign Language 1-4(1-4,0) Students focus on a special research area under the guidance of a faculty member. After acquiring the requisite background, students formulate hypotheses for a group project, develop a critical framework, and initiate research on a specific topic.

A S L 401 Discourse in American Sign Language I 3(3,0) Designed for advanced-level students in American Sign Language. Primary goal is to further develop students' understanding and knowledge of American Sign Language by incorporating in-depth analysis of American Sign Language's historical development, linguistic structures, syntax, grammar, and pragmatics. *Preq:* A S L 302 or consent of instructor.

A S L 402 Discourse in American Sign Language II 3(3,0) Continuation of American Sign Language 401. Primary goal is to further develop students' understanding and knowledge of American Sign Language by incorporating analysis of time concepts, variations due to region and ethnicity, pluralization, classifiers, locatives, temporal aspects, and pronoun usage in American Sign Language. *Preq:* A S L 401 or consent of instructor.

A S L 460 Deaf Literature and Folklore 3(3,0) Designed for advanced-level students in American Sign Language. Primary goal is to further develop students' knowledge and understanding of Deaf literature, folklore, and the community at large. Includes introductions to deaf authors, literary works, plays, poetry, painting, and sculpture. *Preq:* A S L 302 or consent of instructor.

A S L 497 Creative Inquiry—American Sign Language 1-4(1-4,0) Continuation of research initiated in A S L 397. Students complete their projects and disseminate their research results. *Preq:* A S L 397 or consent of instructor.

A S L 498 Independent Study 1-3(1-3,0) Supervised research and study on topics related to the origins and growth of American Sign Language and the Deaf Community in the United States (1800–present). May be repeated for a maximum of six credits. *Preq:* A S L 202 or consent of instructor.

ANIMAL AND VETERINARY SCIENCES

Professors: M. M. Beck, *Chair*; G. P. Birrenkott Jr., A. B. Bodine II, S. K. Duckett, A. K. Greene, T. C. Jenkins, D. V. Maurice, T. R. Scott, P. A. Skewes; *Associate Professors:* S. E. Ellis, M. A. Hall; *Assistant Professors:* J. R. Gibbons, C. J. Mortensen, S. L. Pratt, K. L. Vernon; *Instructors:* B. G. Bolt, J. L. Fain, L. M. Morgan

AVS 100 Orientation to Animal and Veterinary Sciences 1(2,0) Study of the role of animal agriculture in the world today emphasizing supply and demand of end products and careers available in the animal industry.

AVS 101 Dairy Foods 1(1,0) Study of production aspects of dairy foods from the farmer to the consumer, including such products as ice cream, yogurt, and various cheeses. Considers the use of these foods for nutrition and pleasure.

AVS 150 Introduction to Animal Science 3(3,0) Survey of animal industries and their role in society. Examines the relationship between man and animals in both a current and historical context.

AVS 151 Introduction to Animal Science Laboratory 1(0,2) Examines the basic principles in the handling of livestock and techniques of farm animal production as well as orientation to animal production units. *Coreq:* AVS 150.

AVS 200 Beef Cattle Techniques 2(1,2) Examines basic principles in the techniques and management associated with production of both beef cattle and sheep. Students may take only one techniques course per semester. *Coreq:* AVS 150, 151.

AVS 201 Poultry Techniques 2(1,2) Basic principles of the production of poultry are discussed and demonstrated. Students receive hands-on experience in the production and processing of poultry. Students may take only one techniques course per semester. *Preq:* AVS 151.

AVS 203 Dairy Science Techniques 2(1,2) Introduction to dairy production and processing. Laboratories include hands-on opportunities for management of dairy cattle, quality control of milk, and processing of milk and dairy products. Students may take only one techniques course per semester. *Preq:* AVS 151.

AVS 204 Horse Care Techniques 2(1,2) Basic principles of equine behavior, handling, and management are discussed and demonstrated. Students receive hands-on experience with various management techniques, including handling and all aspects of health care. Students may take only one techniques course per semester.

AVS 205 Horsemanship I 2(0,4) Designed for beginner to intermediate riders. The mechanics of safety, longeing, basic position, cues, and rider's aids for both western and English disciplines are covered. *Preq:* AVS 151.

AVS 206 Swine Techniques 2(1,2) Examines the basic principles in the techniques and management associated with production of swine. Students may take only one techniques course per semester. *Preq:* AVS 150, 151.

AVS 207 Horsemanship II 2(0,4) Designed for intermediate to advanced riders to enhance basic horsemanship and develop specific skills for advanced maneuvers in both western and English disciplines. Students concentrate on individual work and establish finesse and subtlety of aids. Training and artificial aids are discussed and/or implemented in riding sessions. *Preq:* AVS 205 and consent of instructor.

AVS 208 Techniques of Teaching Horsemanship 3(2,2) Discusses teaching techniques and theory and handling of large mounted groups. Trains beginner through advanced levels. *Preq:* AVS 205.

AVS 209 Livestock Exhibition Techniques 2(1,2) Students learn techniques associated with exhibition and evaluation of beef, dairy, equine, poultry, and swine.

AVS 301 Anatomy and Physiology of Domestic Animals 4(3,3) Study of physiology and associated anatomy of the body systems, including nervous, skeletal, muscular, respiratory, digestive, circulatory, urinary, reproductive, and endocrine systems. Designed primarily for students in Animal and Veterinary Sciences. *Preq:* BIOL 104/106 or 111.

AVS 302 Livestock Selection and Evaluation I 2(1,2) Selection and evaluation of the meat species of livestock with application of theory applied in multiple field exercises.

AVS 303 Livestock Selection and Evaluation II 2(1,2) Selection and evaluation of the meat species of livestock with application of theory applied in multiple field exercises. *Preq:* AVS 302.

AVS 305 Meat Grading and Selection 2(1,2) Classification, grading, and selection of beef, lamb, and pork carcasses and wholesale cuts and factors influencing quality and value are studied. Students are eligible to compete in intercollegiate meat-judging contests.

AVS 309 Principles of Equine Evaluation 2(0,4) Discusses the selection and evaluation of equines for various disciplines. Emphasizes current industry standards with regard to "form to function." Students place classes of four horses and develop oral reasons to defend their placing. Opportunities for competitive horse judging teams are available.

- AVS 310 Animal Health 3(3,0)** Discusses basic principles of animal health. Emphasizes disease prevention in beef cattle, dairy cattle, goats, horses, poultry, and swine. The most common and important diseases and zoonosis of farm animals are explained. *Preq:* AVS 150.
- AVS 311 Dairy Cattle Selection 2(1,2)** Dairy selection and evaluation methods are studied, including evaluation according to the Purebred Dairy Cattle Association scorecard, linear evaluation, pedigrees, and Dairy Herd Improvement Association records. Emphasizes presentation of oral reasons.
- AVS 312 Forages and Grazing Systems 3(2,2)** Familiarizes students with the interaction of forage plants and grazing animals. Includes practical application of theory to management issues as it relates to the relationship between plants and animals. *Preq:* AVS 150, BIOL 103/105 or 111.
- AVS 315 Animal Welfare 3(3,0)** Discussion of past, present, and future human/animal interaction. Topics include wild animals, domestication, animal welfare organizations, animal rights organizations, welfare assessment, animal agriculture, animal research, and other current topics. *Preq:* Junior standing.
- AVS 323 Poultry and Poultry Products Evaluation 2(0,4)** Selection of layers, broilers, and turkeys. Grading of poultry products according to USDA grade standards is also studied. Students are eligible to compete in intercollegiate poultry judging contests. May be repeated for a maximum of four credits.
- AVS 330 Animal Pathology 3(3,0)** Acquaints students with animal pathology, including cell injury, inflammation, neoplasia, immunologic disease, and pathology of various organ systems. *Preq:* AVS 301.
- AVS 360 Internship 1-12(0,3-36)** Off-campus, preplanned, reviewed, approved, and supervised educational experience in an area related to animal and veterinary sciences. Based on a multifaceted work experience in a highly structured professional environment. Students submit periodic written reports and a final written and oral report. To be taken Pass/Fail only. *Preq:* Junior standing in Animal and Veterinary Sciences and consent of instructor.
- AVS 370, H370 Principles of Animal Nutrition 3(3,0)** Familiarizes students with nutrients and feeds used in livestock and specialty animal production. Methods of evaluating common feed-stuffs are covered along with a survey of the functioning of the various digestive systems. Practical aspect to feeding each species is covered. *Preq:* AVS 150, CH 102.
- AVS 375, H375 Applied Animal Nutrition 3(2,2)** Students learn procedures for formulating diets that meet nutrient requirements of livestock and poultry, utilizing traditional mathematical approaches and computerized formulation. Computerized least-cost formulation of diets is covered along with familiarization with feeding systems and approaches. *Preq:* AVS 370.
- AVS 385 Equine Behavior and Training 2(0,6)** Introduces students to the initial processes in gentling and riding young horses. Students work with two- and three-year-old horses to desensitize them to stimuli in preparation for riding. Students do groundwork and put the initial rides on the horses. *Preq:* AVS 205 or 207.
- AVS 386 Advanced Equine Behavior and Training 2(0,6)** Students train young horses advanced skills in western or English disciplines. Students actively prepare horses for show or sale and participate in a show or marketing/sale of their assigned horse. Develops students' negotiation and communication skills, industry insight, and industry-specific jargon. May be repeated for a maximum of four credits. *Preq:* AVS 385.
- AVS 390 Practicum 1-3(0,3-9)** On-campus, preplanned, supervised learning experience in an area related to animal and veterinary sciences. Gives experience not covered in other classwork. May be repeated for a maximum of four credits. To be taken Pass/Fail only. *Preq:* Consent of instructor supervising practicum.
- AVS 401, H401, 601 Beef Production 4(3,2)** Discusses breeding, feeding, reproduction, and management of beef cattle. Emphasizes production systems integrating disciplines of animal agriculture into management plans and alternatives. Practical applications of beef production and management practices are also presented. *Preq:* AVS 370.
- AVS 405 Advanced Selection and Evaluation 2(0,4)** Special and advanced training in selection and evaluation of breeding, performance, and market animals or their products. Species used are beef and dairy cattle, sheep, swine, and horses. *Preq:* AVS 302 or 303 or 305 or FD SC 304; 309 or 311 and consent of instructor.
- AVS 406 Seminars and Related Topics 2(3,0)** Students conduct in-depth library research on current topics related to animal science and give formal presentations using multimedia technology. Students also prepare scientific posters, learn interviewing skills, prepare résumés, and observe professional speakers. *Preq:* Senior standing.
- AVS 409 Selected Topics 1-3(1-3,0)** Topics of interest to students at the undergraduate, graduate, and professional levels. Provides experience with problems not covered in other courses or on thesis research. May be repeated for a maximum of six credits, but only if different topics are covered.
- AVS 410, 610 Domestic Animal Behavior 3(3,0)** Provides knowledge and understanding of behavior related to perception, learning, sociality, reproduction, feeding, and health for application in production, training, and design of environments for optimum health and welfare of domestic animals. *Preq:* AVS 150, 151 and Junior standing.
- AVS 411, 611 Animal Growth and Development 3(3,0)** Integration of the nutritional, physiological, and genetic basis for animal growth and development with application to livestock and poultry production. Includes the cellular and molecular mechanisms controlling these processes and emphasizes the genes that regulate animal products (meat, eggs, wool, and milk). *Preq:* AVS 301.
- AVS 412, H412, 612 Advanced Equine Management 4(3,2)** Further discussion of special considerations of the equine regarding housing, manure management, nutrition, reproduction, transportation, and behavior. Students gain insight into how horses differ from other livestock species and their unique requirements for the above systems. *Preq:* AVS 370.
- AVS 413, 613 Animal Products 3(2,3)** Introduction to the safe and humane production of red meat, poultry, and dairy products. Includes HACCP principles and production of value-added animal products.
- AVS (BIOSC, MICRO) 414, H414, 614 Basic Immunology 4(3,3)** See MICRO 414.
- AVS 415, 615 Contemporary Issues in Animal Science 3(3,0)** Provides knowledge, understanding, and critical analytical skills on current issues in animal agriculture in diverse regional, national, and global social-cultural and political environments as they impact animals and man. *Preq:* Junior standing in Animal and Veterinary Sciences.
- AVS 416, 616 Equine Exercise Physiology 4(3,2)** Integration of muscle, bone, cartilage, cardiovascular, and respiratory systems as related to the equine athlete. Encompasses biomechanics, kinetics, and kinesiology related concepts specific to the horse. Further discussion of diseases related to specific systems is covered. *Preq:* AVS 301.
- AVS 417, 617 Animal Agribusiness Development 2(1,2)** Team-based development of a business relating to the animal industries. Students develop the business from the initial idea through operations. Focuses on the development of the business plan, including financials, personnel management, and resources needed. *Preq:* ACCT 201 and AP EC 202 or consent of instructor.
- AVS 418, 618 Muscle Biology and Lean Meats 3(2,2)** Biology of animal muscle, connective, fat, and bone tissue with laboratory emphasis on low-fat sausages and restructured, value-added meat products. *Preq:* AVS 202.
- AVS 420, 620 Poultry Science On-line 3(3,0)** On-line course covering the physiology, nutrition, health, reproduction, genetics, breeding, housing, and management of commercial poultry species, including the processing of meat and egg products.
- AVS 422 Special Problems 1-3(0,3-9)** Laboratory, library, or field study of problems related to animal and veterinary sciences, emphasizing development and testing of hypothesis and reporting of results. May be repeated for a maximum of four credits. *Preq:* Junior standing and consent of instructor supervising study.
- AVS 441 Animal and Veterinary Sciences Teaching Experience 1-3(1-3,0)** Formal teaching experience related to animal and veterinary sciences supervised by a faculty member. May involve classroom instruction, educational material development, and/or student evaluation and assessment. Students submit periodic written reports and a final written and oral report. May be repeated for a maximum of four credits. To be taken Pass, Fail only. *Preq:* Consent of instructor.

AVS 442 Animal and Veterinary Sciences Extension Experience 1-3(1-3,0) Formal experience in extension education. Students are involved in development, implementation, or assessment of adult or youth educational programs related to animal and veterinary sciences, under supervision of extension professionals. Students submit periodic written reports and a final written and oral report. May be repeated for a maximum of four credits. To be taken Pass/Fail only. *Preq:* Consent of instructor.

AVS 443 AVS International Experience 1-3(1-3,0) Preplanned and approved international education/cultural experience supervised by an Animal and Veterinary Sciences faculty member. Periodic reports or record keeping are required. Final report and oral presentation are required at the end of the experience. May be repeated for a maximum of four credits. To be taken Pass/Fail only. *Preq:* Consent of instructor.

AVS 444 AVS Animal Agribusiness Travel Experience 2(1,2) Classroom and travel course to expose students to animal production operations, agribusiness, and industry leaders across various geographical areas. Travel is conducted during spring break and includes visits to farms, universities, and agribusinesses. Additional fee is required. To be taken Pass/Fail only. *Preq:* Junior standing in Animal and Veterinary Sciences, consent of instructor.

AVS 450 Sustainable Livestock Production Systems 4(3,2) Critical analysis of sustainable livestock production systems and associated factors. Principles of decision making, business analysis, management practices, resource assessment and allocation are covered in a variety of sustainable livestock production schemes.

AVS 453, H453, 653 Animal Reproduction 3(2,2) Reproductive physiology and endocrinology of mammals with emphasis on farm animals and frequent reference to reproduction in laboratory animals and humans. *Preq:* AVS 150, 301.

AVS 455, 655 Animal Reproductive Management 2(1,3) Physiology and endocrinology of pregnant and nonpregnant cows are discussed. Emphasizes methods of artificial insemination, pregnancy detection, and computer record keeping to achieve a high level of reproductive efficiency in cattle. *Preq:* AVS 150, 301; AVS 453 (or concurrent enrollment).

AVS 465, 665 Animal Physiology I 3(3,0) Advanced study of the physiological systems of domestic animals as these systems relate to the integrated functions of the body. Exposes students to advanced physiological concepts and current literature perspectives on a variety of body systems and processes. *Preq:* Introductory physiology and biochemistry.

AVS 467, 667 Animal Physiology II 3(3,0) Advanced course extending coverage of major and current topics in animal physiology across species not previously covered in AVS 465. Major topics include digestive physiology in nonruminant and ruminant species, reproductive physiology, muscle physiology, and general aspects of avian physiology. *Preq:* Introductory course in physiology and biochemistry.

AVS 470, H470, 670 Animal Genetics 3(3,0) Fundamental principles relating to the breeding and improvement of livestock, including variation, heredity, selection, linebreeding, inbreeding, crossbreeding, and other related subjects. *Preq:* AVS 150.

AVS (BIOSC) 480, 680 Vertebrate Endocrinology 3(3,0) See BIOSC 480.

AVS 491 Animal and Veterinary Sciences Undergraduate Research Experience 1-3(1-3,0) Formal laboratory, library, or field study of problems related to animal and veterinary sciences, emphasizing hypothesis development, testing, and reporting results. Projects are preplanned, reviewed, and approved. Students submit periodic written reports and final written and oral reports. May be repeated for a maximum of four credits. *Preq:* Consent of instructor.

ANTHROPOLOGY

Professor: J. M. Coggeshall; *Associate Professors:* E. L. Williams, Y. Zhang; *Assistant Professors:* M. A. Vogel, K. E. Weisenec; *Adjunct Assistant Professor:* L. G. Rapaport

ANTH 201 Introduction to Anthropology 3(3,0) Offers a four-field overview: primates and human biological origins; the development of agriculture and complex societies in the archaeological record; contemporary human societies cross-culturally; and the relationship between languages and cultures. An anthropological perspective on contemporary human problems is also presented.

ANTH 301 Cultural Anthropology 3(3,0) Explores human cultural diversity and current global issues. Examines food production and economic distribution, political organization, marriage and family, and religious systems in contemporary cultures. *Preq:* ANTH 201 or consent of instructor.

ANTH 320 North American Indian Cultures 3(3,0) Discusses the prehistory of Native peoples, their cultural diversity at European contact, and the history and impact of that contact. Also examines contemporary issues facing Native Americans. *Preq:* ANTH 201 or consent of instructor.

ANTH 331 Archaeology 3(3,0) Overview of anthropological archaeology emphasizing the scientific analyses, methodologies and theoretical approaches used by anthropological archaeologists to study the human past. Students learn about the origins and development of complex society and explore individual case studies.

ANTH 332 World Archaeology 3(3,0) Global survey of the earliest complex societies focusing on the origins of "pristine states" from the perspective of anthropological archaeology. Following a brief overview of archaeological methods and approaches, students learn about the origins of complex societies of Mesopotamia, the Indus Valley, Egypt, China, Mesoamerica, and the Andes.

ANTH (BIOSC) 351 Biological Anthropology 3(3,0) Study of humans as biological organisms. Examines human evolution, primate social behavior, human physiological variations and disease resistance, and human skeletal anatomy and forensics.

ANTH (BIOSC) 353 Forensic Anthropology 3(3,0) Introduction to forensic anthropology, the science that utilizes methods from skeletal biology and archaeology as tools in human identification in a medico-legal context. *Preq:* Junior standing or consent of instructor.

ANTH (LANG) 371 Language and Culture 3(3,0) See LANG 371.

ANTH 403, 603 Qualitative Methods 3(3,0) Methods and techniques of qualitative field research, including participant observation, ethnographic interviewing, data analysis, and report writing. *Preq:* ANTH 201 or consent of instructor.

ANTH (JAPN) 417 Japanese Culture and Society 3(3,0) See JAPN 417.

ANTH (CHIN) 418 Chinese Culture and Society 3(3,0) See CHIN 418.

ANTH (W S) 423 Women in the Developing World 3(3,0) Comparative anthropological study of women and their status in developing countries around the world. A survey of women's daily lives in a global context, emphasizing education, economics, and the environment. Case studies include microfinance, literacy, reproductive rights and practices, and the impact of religious fundamentalism on women. *Preq:* Sophomore standing.

ANTH 451 Biological Variation in Human Populations 3(3,0) Provides an in-depth discussion of the most influential topics in human skeletal biology. Course explores the history and ethical dilemmas of the field, and examines how biological anthropologists use skeletons to reconstruct patterns of diet, disease, demography and physical activity in human populations. *Preq:* ANTH 201 or consent of instructor.

ANTH (BIOSC) 466, 666 Evolution of Human Behavior 3(3,0) See BIOSC 466.

ANTH 495 Field Studies 1-6(1-2,2-12) Group field project in settings selected by the instructor to provide students with a variety of exposures to various cultural contexts. Archaeological digs are included. Project progress and student interpretations of findings are monitored by periodic group meetings and shared experiences. May be repeated for a maximum of six credits. *Preq:* ANTH 301 or equivalent and consent of instructor.

ANTH 496 Creative Inquiry—Cultural Anthropology 1-3(1-3,0) Investigates topics in cultural anthropology selected by faculty and students. Goals, research, and outcomes vary from semester to semester and project to project. May be repeated for a maximum of 12 credits. *Preq:* ANTH 201.

ANTH 498 Independent Study 1-3(1-3,0) Individual readings or projects in anthropological areas not covered in other courses. May be repeated for a maximum of six credits with advisor's approval. *Preq:* ANTH 201.

APPLIED ECONOMICS

Professors: C. E. Curtis Jr., M. Espey, D. W. Hughes, W. M. Smathers Jr., W. M. Ward; *Associate Professors:* T. D. Davis, R. D. Lamie, S. R. Templeton, D. B. Willis; *Assistant Professors:* K. A. Boys, C. E. Carpio, O. Isengildina-Massa, J. D. Kropp, K. L. Robinson; *Research Assistant Professor:* T. Boonsaeng

- AP EC 102 South Carolina and the Global Economy 3(3,0)** Explores important aspects of globalization. Includes the role of market-based systems, trade, financial flows, and immigration. Emphasizes the world-wide economic integration of the United States, generally, and South Carolina in particular.
- AP EC 202 Agricultural Economics 3(3,0)** Analytical survey of the various subdivisions of agricultural economics, including farm organization, enterprise, land economics, marketing, farm prices, governmental farm policies, and the relation of agriculture to the national and international economy.
- AP EC 205 Agriculture and Society 3(3,0)** Introduction to the development of world society focusing on food production, from early hunting and gathering to modern biotechnology. Covers factors driving societal growth with a global perspective. Explores systematic impacts of growth in technical capacity to produce agricultural products on farm and community organization, industrialization, and the global economy.
- AP EC 257 Natural Resources, Environment, and Economics 3(3,0)** Economic principles applied to resource allocation problems related to environmental and natural resource issues.
- AP EC 302 Economics of Farm Management 3(3,0)** Economic principles underlying the organization and operation of agricultural firms and related business enterprises. Particular emphasis is placed on management aspects of the farm as a production unit. *Preq:* AP EC 202 or ECON 211.
- AP EC 308 Quantitative Applied Economics 3(3,0)** Basic quantitative relationships in applied economics are examined and interpreted. Emphasizes the mathematical aspects of applied economics. Microcomputer software is utilized for problem solving.
- AP EC 309, H309 Economics of Agricultural Marketing 3(3,0)** General course in marketing agricultural commodities with particular emphasis upon food products. Analyzes efficiency criteria, consumer behavior, market organizations and institutions, and marketing functions. *Preq:* AP EC 202.
- AP EC 313 Principles of Real Estate Appraisal 3(3,0)** Introduction to basic principles and procedures of real estate appraisal. Topics include the real estate market, principles of valuation, legal concepts, and the application of the comparable sales, cost, and income approaches to real estate valuation. *Preq:* FIN 307 or consent of instructor.
- AP EC 319 Agribusiness Management 3(3,0)** Study of the principles used in making management decisions and the application of these principles in agribusiness. Emphasizes the application of economics to the solution of problems facing managers of agricultural supply and marketing firms. *Preq:* AP EC 302 or 309.
- AP EC 351 Principles of Advertising 3(3,0)** Introduction to the various functions of advertising; research and audience analysis; various media formats; planning, research, and production necessary to create an advertising campaign; social effects, economic effects, and ethical considerations of advertising.
- AP EC 352 Public Finance 3(3,0)** Principles of financing government, sources of public revenue, objects of public expenditures, problems of fiscal administration, and the application of fiscal policies in stabilizing the national economy. *Preq:* Junior standing.
- AP EC (C R D) 357 Natural Resources Economics 3(3,0)** See C R D 357.
- AP EC (C R D, HLTH) 361 Introduction to Health Care Economics 3(3,0)** See C R D 361.
- AP EC 402, 602 Production Economics 3(3,0)** Economic analysis of agricultural production involving the concept of the farm as a firm; principles for decision making; the quantitative nature and use of production and cost functions and the interrelations and applications of these principles to resource allocation in farms and among areas. *Preq:* AP EC 308, ECON 314.
- AP EC 403, 603 Land Economics 3(3,0)** Study of the characteristics of land and of the physical, legal, social, and economic principles and problems relating to the control and use of land resources. *Preq:* AP EC 202 or ECON 200.
- AP EC 409, 609 Commodity Futures Markets 3(3,0)** Introduction to the economic theory, organization, and operating principles of agricultural commodity futures markets in the United States. Emphasizes speculating, hedging, and investing in agricultural commodity futures contracts from the standpoint of the agribusiness entrepreneur. *Preq:* AP EC 202 or ECON 211.
- AP EC (C R D) 411, 611 Regional Impact Analysis 3(3,0)** See C R D 411.
- AP EC (C R D) 412, 612 Regional Economic Development Theory and Policy 3(3,0)** See C R D 412.
- AP EC 413, 613 Advanced Real Estate Appraisal 3(3,0)** Topics include highest and best use analysis, data collection, and analyses. Stresses advanced appraisal procedures for income, cost, and comparable sales approach to real estate valuation. Covers eminent domain, the appraisal of property in transition, and specialized property. *Preq:* AP EC 313, FIN 307, or consent of instructor.
- AP EC 420, 620 World Agricultural Trade 3(3,0)** Review of practical considerations of agricultural trade and trade policy analysis. Considers the role of international institutions. Special emphasis is placed on concepts of agricultural trade, analysis of trade policies of major trading partners/competitors, and export/import marketing of products. Offered spring semester only. *Preq:* AP EC 309, ECON 412, or consent of instructor.
- AP EC 421, 621 Globalization 3(3,0)** Utilizes basic principles of international economics (comparative advantage, free trade versus protectionism, exchange rate determination, etc.) to analyze the contemporary problems and issues of the world economy. Emphasizes application of economic principles to current globalization trends. *Preq:* ECON 310 or 412 or 413 or consent of instructor.
- AP EC (CSENV) 426, 626 Cropping Systems Analysis 3(2,2)** See CSENV 426.
- AP EC 433, 633 Agricultural Law and Related Environmental Issues 3(3,0)** Introduction to agricultural and agriculture-related environmental legal issues. Topics include a review of laws, agencies, programs, court structure, torts, taxation, biotechnology, land and water use, regulated industry, and environment liabilities as they relate to agriculture and natural resources. *Preq:* LAW 322 or consent of instructor.
- AP EC 452, H452, 652 Agricultural Policy 3(3,0)** Review of public agricultural policy programs in the United States and a critical examination of current and proposed government policies and programs affecting the agricultural sector of the economy. Includes economic considerations as related to past and current farm price and income problems. *Preq:* AP EC 302, 309.
- AP EC 456, H456, 656 Prices 3(3,0)** Review of the basic theory of price under competitive conditions and various modifications; nature, measurement, and causes of daily, seasonal, and cyclical price fluctuations; geographical price relationships; nature, function, and behavior of futures markets; government price programs. *Preq:* AP EC 308, ECON 314, EX ST 462.
- AP EC 457, 657 Natural Resource Use, Technology, and Policy 3(3,0)** Focuses on economic analyses of actual, efficient, and sustainable uses of natural resources, impacts of technologies that affect these uses, and policies that affect development and use of such technologies. Resource-technology-policy combinations may vary, but an example is crude oil, hybrid automotive engines, and fuel economy standards. *Preq:* MTHSC 102; and C R D (AP EC) 357 or ECON 314.
- AP EC 458, 658 Economics of Risk Management 3(3,0)** Focuses on cost-benefit analysis of risks, incorporation of economic considerations into risk assessments, and microeconomic analysis of activities, insurance, and policies that reduce, mitigate, or increase these risks. Possible topics include climate change, wildland fire, erosion, pests and invasive species, pestilence, food contamination, and hurricanes. *Preq:* MTHSC 102 and C R D (AP EC) 357 or ECON 314.
- AP EC 460, 660 Agricultural Finance 3(3,0)** Study of the principles and technique of financing in the agricultural sector. Topics include the capital situation in agriculture, concepts of farm financial management, use of credit, capital markets, lending agencies, and estate planning. *Preq:* ACCT 201, AP EC 202.
- AP EC (W F B) 475, 675 Economics of Wildlife Management and Policy 3(3,0)** Integrated approach to the study of the economics of wildlife. Topics include determination of market and nonmarket value, single and multiple species management, enterprise cost and returns, marketing wildlife, leasing methods, complementarity and competitiveness with agricultural and forestry enterprises, and timber and crop damage cost estimates and control. *Preq:* AP EC 202, ECON 200, FOR 304, W F B 306, or consent of instructor.
- AP EC 490 Selected Topics 1-15(0,2-30)** Study of topics in applied economics. Topics may include classroom and/or field experience not normally covered in other classes. May be repeated for credit, but only if different topics are covered. *Preq:* Junior standing or consent of instructor.

AP EC (C R D) 491 Internship, Agribusiness, and Community and Rural Development 1-6(0,2-12) See C R D 491.

AP EC (C R D) 494 Creative Inquiry—Community and Rural Development 1-3(1-3,0) See C R D 494.

ARABIC

ARAB 101 Elementary Arabic I 4(3,1) Introductory course for beginners emphasizing acquisition of the Arabic alphabet and writing, basic grammar, vocabulary, speaking and listening skills, and developing strategies for the successful long-term acquisition of Arabic.

ARAB 102 Elementary Arabic II 4(3,1) Continuation of ARAB 101 consisting of three hours a week of classroom instruction and one hour a week in the language laboratory. *Preq:* ARAB 101.

ARAB 201 Intermediate Arabic I 3(3,1) Continuation of ARAB 102, emphasizing grammar, vocabulary, writing, reading, and acquisition of intermediate language skills. *Preq:* ARAB 102.

ARAB 202 Intermediate Arabic II 3(3,1) Continuation of ARAB 201, emphasizing grammar, vocabulary, writing, reading, and acquisition of advanced intermediate language skills. *Preq:* ARAB 201.

ARCHITECTURE

Professors: D. J. Allison, J. F. Barker, *President*; J. R. Caban, *Interim Chair*; E. T. Cavanagh, L. G. Craig, R. J. Hogan, *Associate Chair*; Y. Kishimoto, R. J. Miller (*Charleston*), S. F. Verderber, *Associate Professors:* D. G. Battisto, K. E. Green, H. C. Harritos, D. A. Hecker, N. J. Hurt, R. T. Silance; *Assistant Professors:* V. Y. Blouin, U. Heine, R. T. Huff (*Charleston*), P. L. Laurence, B. F. Sill, M. L. Skinner; *Lecturers:* R. A. Bruhns, P. A. Hedegor (*Charleston*), A. H. Jacques, A. K. Jennings (*Charleston*), D. M. Lee, M. T. Maher (*Charleston*), C. B. Mills, L. M. Mitchell, G. A. Nicholson (*Charleston*), D. A. Pastre (*Charleston*)

ARCH 101 Introduction to Architecture 3(3,0) Introduction to the discipline and profession of architecture. Lectures and discussion cover a broad range of architectural issues throughout history. Emphasizes the relationship between architecture and other disciplines as well as across cultures. Includes the development of individual digital portfolio.

ARCH 151 Architecture Communication 5(2,6) Introduction to principles and elementary vocabulary of architectural design. Collaborative studio which offers instruction in the specific skills of formal design composition, visual communication, oral presentation, and computer literacy. *Preq:* ARCH 101.

ARCH 152 Collaborative Studio II 3(1,6) Continuation of ARCH 151. Introduction to an elemental vocabulary of architecture within basic spatial design problems, emphasizing visual communications skills, oral presentations of work, and analysis and discussion of design issues through critical readings of canonical texts and buildings. *Preq:* ARCH 151.

ARCH 201 Introduction to Architecture 3(3,0) Examines basic concepts of architectural design using historic and contemporary examples. Principles of design, programmatic concerns, design documents, and construction are discussed in the context of the practice of architecture.

ARCH 251 Architecture Foundations I 6(3,6) Architectural analysis and design problems with a focus on understanding the context of architecture. Specific investigation of buildings as part of the cityscape and the landscape. Instruction on visual communications skills, computer modeling, and oral presentation techniques support the design discussions. *Preq:* ARCH 151.

ARCH 252 Architecture Foundations II 6(3,6) Continuation of ARCH 251. Architectural design problems with a focus on structural and construction principles and their relationship to contextual situations. Instruction in oral communication skills and computer graphics support the design discussions. *Preq:* ARCH 251.

ARCH 351 Studio Clemson 6(1,11) Addresses architectural problems with varied scales, programs, and locations. Emphasizes the relationship between architecture and context. Projects include analysis, conceptual development, and architectonic resolutions. Continued development of graphic and oral communication skills. Design problems vary every semester according to current issues. May be repeated for a maximum of 18 credits. *Preq:* ARCH 252.

ARCH 352 Studio Charleston 6(1,11) Addresses architectural problems with varied scales and programs in the context of Charleston, South Carolina. Emphasizes the relationship between architecture and context. Projects include analysis, conceptual development, and architectonic resolutions. Continued development of graphic and oral communication skills. Design problems vary every semester according to current issues. May be repeated for a maximum of 12 credits. *Preq:* ARCH 252.

ARCH 353 Studio Genoa 6(1,11) Addresses architectural problems with varied scales and programs in the context of Genoa, Italy, and historic Europe. Emphasizes the relationship between architecture and context. Projects include analysis, conceptual development, and architectonic resolutions. Design problems vary every semester according to current issues. Continued development of graphic and oral communication skills. May be repeated for a maximum of 12 credits. *Preq:* ARCH 252.

ARCH 354 Studio Barcelona 6(1,11) Addresses architectural problems with varied scales and programs in the context of Barcelona, Spain. Emphasizes the relationship between architecture and context. Projects include analysis, conceptual development, and architectonic resolutions. Continued development of graphic and oral communication skills. Design problems vary every semester according to current issues. May be repeated for a maximum of 12 credits. *Preq:* ARCH 252.

ARCH 355 Studio South 6(1,11) Addresses architectural problems with varied scales and programs in the context of the South. Emphasizes the relationship between architecture, community, and context. Projects include analysis, conceptual development, and architectonic resolutions. Continued development of graphic and oral communication skills. Design problems vary every semester according to current issues. May be repeated for a maximum of twelve credits. *Preq:* ARCH 252.

ARCH 401 Architectural Portfolio 3(3,0) Continues portfolio development for Architecture students, including professional portfolio, academic portfolio, and digital portfolio. *Preq:* ARCH 101. *Coreq:* ARCH 452, 453; Graduating Senior standing.

ARCH 403 The Modern Architectural Movement 3(3,0) Seminar in the analysis and criticism of architectural and town building works. Course sequence includes historic and contemporary examples, literary searches, field trips, essays, and oral reports. *Preq:* Senior standing or consent of instructor.

ARCH 404 Current Directions in Architecture 3(3,0) Critical analysis of the development and current directions of modern movements in architecture. *Preq:* Senior standing or consent of instructor.

ARCH 405, 605 American Architectural Styles 1650–1950 3(3,0) Survey of American architectural styles and of the architects responsible for them, from the Colonial period to our recent past. Considerable emphasis is placed on identifying those architectural elements which serve as clues in determining a building's architectural style.

ARCH 412, 612 Architectural History Research 3(3,0) Directed investigations related to the art and architectural history of Europe. May be repeated for a maximum of six credits. *Preq:* Junior standing or consent of instructor.

ARCH 414, 614 Design Seminar 3(3,0) Exploration of topical issues in architecture, art, construction, and planning. May be repeated for a maximum of six credits. *Preq:* Junior standing or consent of instructor.

ARCH 416, 616 Field Studies in Architecture and Related Arts 3(0,9) Documentation and analysis of architectural structures observed during European travels in graphic and written form. May be repeated for a maximum of six credits. *Preq:* Junior standing or consent of instructor.

ARCH 421 Architectural Seminar 3(3,0) Lectures and seminars dealing with pertinent topics related to environmental and technological considerations in architecture and the building industry. *Preq:* Senior standing or consent of instructor.

ARCH 422 New Directions Seminar 3(3,0) Exploration into careers which relate directly (i.e., construction law) or indirectly (i.e., public relations) to the making of our built environment.

ARCH 424, 624 Product Design 3(0,9) Furniture and product system design with emphasis on ergonomics and the relationship of form and materials. *Preq:* Senior standing and consent of instructor.

ARCH 425, 625 Energy in Architecture 3(3,0) Climate design methodology and its influence on building energy patterns and architectural form. *Preq:* Senior standing and consent of instructor.

- ARCH 426, 626 Architectural Color Graphics 3(3,0)** Architectural color graphics by computer. Theories of color classification and interaction; application of color theories to art and architecture. *Preq:* Consent of instructor.
- ARCH 427, 627 Advanced Color Graphics 3(3,0)** Theories of color classification and interaction; three-dimensional color modeling by computer; advanced application of color theories to art and architecture. *Preq:* ARCH 426 or consent of instructor.
- ARCH 428, 628 Computer-Aided Design 3(2,3)** Introduction to the concepts, skills, and applications of computer-aided design as they relate to the practice of architecture. *Preq:* Senior standing or consent of instructor.
- ARCH 429, 629 Architectural Graphics 3(3,0)** Provides students with an understanding of the concepts, skills, techniques, and strategies of visual presentation/graphics as they relate to the design professions—architects/landscape architects. *Preq:* Junior standing or consent of instructor.
- ARCH 430, 630 Theories and Philosophies of Technology and Architecture 3(3,0)** Theoretical and practical examination of technology and architecture from pre-modern and modern viewpoints to study its nonneutral role in shaping and reflecting knowledge, beliefs, and actions within a cultural context.
- ARCH 431, 631 Virtual Reality in Architecture 3(3,0)** Introduction and exploration of the theories and concepts of virtual reality and their use in modeling three dimensional spaces. Instruction in computer modeling, lighting, and texture mapping is offered. Projects focus on the creation and presentation of a virtual environment. *Preq:* Junior standing or consent of instructor.
- ARCH 440, 640 New York Field Study 3(3,0)** Study of architecture, art, planning, and urban design of New York. Two weeks of residence are required with scheduled field trips to relevant sites in all five boroughs, with counseling to determine research interests. Guidance is provided to resources in the city. A final report is required. Offered Maymester only.
- ARCH 451 Architecture Studio III 6(1,11)** Continuation of ARCH 352. Advanced architectural issues of program and theory, synthesis of ideas, and self-criticism. *Preq:* ARCH 352.
- ARCH 452 Synthesis Studio 6(1,11)** Integrates acquired skills, abilities, and interests from previous architecture studios. Projects emphasize the accumulation of architectural experiences and knowledge. *Coreq:* ARCH 401, 453; Graduating Senior status.
- ARCH 453 Writing Architecture 3(3,0)** Advanced writing course for architecture majors. Emphasizes synthesis of the architectural education and development of architectural projects through writing. *Preq:* Graduating Senior status. *Coreq:* ARCH 401, 452.
- ARCH 471 Architectural History of Place 3(3,0)** Survey of urban design and architectural history using examples viewed in a particular locale. Emphasizes an overview survey of design movements identifying specific design elements and understanding how they are used in shaping place. Course is offered only during the summer at study abroad locations. *Preq:* ARCH 101 or consent of instructor. *Coreq:* ARCH 472 and DESIGN 370 or consent of instructor.
- ARCH 472 Architectural Field Studies 3(1,6)** Students develop diagramming and writing skills and use them to document and analyze existing works of urban design and architecture observed during field trips. Course is only offered during the summer at study abroad locations. *Preq:* ARCH 101 or consent of instructor. *Coreq:* ARCH 471 and DESIGN 370 or consent of instructor.
- ARCH 477, 677 Introduction of Craft 1-3(0,2-6)** Architectural craft lab offered under different material specializations, all of which introduce students to design as informed by craft through a hands-on lab. Basic craft operations and material properties are introduced for the subject material (wood, steel, etc.) May be repeated for a maximum of six credits. *Preq:* Consent of instructor.
- ARCH 485, 685 History and Theory of Architecture + Health 3(3,0)** Introduces relationships between health and architectural settings for health. Examines connections between cultural context, medical thought, health-care delivery, and health facility design within different time periods. Introduces contemporary theories on the relationships between human beings, their health and well-being, and the design of the physical environment. *Preq:* Consent of instructor.
- ARCH 488, 688 Architectural Programming and Predesign 3(3,0)** Introduces the theory, mechanics, and practice of architectural programming and post-occupancy evaluation. Presents programming as a means to create architectural settings sensitive to the needs of their inhabitants. Emphasizes collaborative methodologies that involve identifying relevant goals, facts, issues, needs, and concepts. Students develop an architectural program. *Preq:* Consent of instructor.
- ARCH 489 Internship 1-6** Practicum in professional practice. Paid work/study in a variety of related disciplines provides students with hands-on experience in design and fabrication fields relevant to the environmental design professions. Consists of two parts: a professional component, managed by an approved sponsor, and an academic component, taught by the instructor. May be repeated for a maximum of 18 credits. *Preq:* Consent of instructor and acceptance by sponsor.
- ARCH 490, H490 Directed Studies 1-5** Comprehensive studies and research of special topics not covered in other courses. Emphasis is on field studies, research activities, and current developments in architecture. May be repeated for a maximum of ten credits. *Preq:* Consent of department chair.
- ARCH 499, H499 Selected Topics in Architecture 1-3(1-3,0)** Study of selected topics in architecture. May be repeated for a maximum of nine credits, but only if different topics are covered. *Preq:* Junior standing or consent of instructor.
- ARCH 557 Architecture Studio 6(0,18)** City planning design and the development of complex building solutions.
- ART**
- Professors:* S. A. Cross, D. M. Detrich, W. W. Lew, M. V. Vatalaro, *Chair*; *Associate Professors:* A. V. Feeser, J. B. LeBlanc, H. J. Jensen; *Assistant Professors:* D. Donar, C. N. Hung, T. McDonald, A. Wrangle; *Lecturers:* S. Grier, L. House, J. R. Manson, A. Plotek, D. C. Woodward-Detrich
- ART 103 Visual Arts Studio 3(0,6)** Studio projects in basic visual elements and principles. The development of creative design process, visual organization, and design skills are introduced as a foundation for further study in visual arts.
- ART 105 Foundation Drawing I 3(0,6)** Introduction to drawing. Presents exploration of observational drawing practices with an emphasis on structural investigations of form and application of spatial systems. Basic materials and approaches associated with drawing are studied and applied. *Preq:* Visual Arts major or consent of instructor.
- ART 106 Foundation Drawing II 3(0,6)** Further exploration of introductory drawing. Emphasizes use of tone and color. Students work primarily with representational categories, developing comprehension of complex forms and spaces in relation to the 2-D planes. Includes use of rigorous observational drawing practices in conjunction with thematic efforts. *Preq:* ART 105 or 151 or consent of instructor.
- ART 151 Foundations in Visual Art I 3(0,6)** Intensive introduction to the fundamentals of visual art. Studio projects, lectures, and discussions introduce topics and projects relative to foundation-level art students. Explores historical and contemporary applications of the elements and principles of design. *Preq:* Visual Arts major.
- ART 152 Foundations in Visual Art II 3(0,6)** Intensive introduction to the fundamentals of visual art. Studio projects, lectures, and discussions introduce topics and projects relative to foundation-level art students. Explores historical and contemporary applications of the elements and principles of design. *Preq:* Visual Arts major.
- ART 153 Orientation to Visual Arts I 1(1,0)** Introduction to the visual arts profession focusing on issues related to various career opportunities, creativity, problem-solving methodologies, and current thinking in contemporary art. *Preq:* Visual Arts major.
- ART 205 Beginning Life Drawing 3(0,6)** Primary emphasis is on drawing from the live model. Students' drawing skills and fundamental understanding of the structure and form of the human figure are reviewed through studio practice, augmented by lectures, discussions, demonstrations, and critiques. Addresses historical and contemporary use of the human figure in visual arts. *Preq:* ART 106, 151, 152; or consent of instructor.

ART 207 Beginning Painting 3(0,6) Introduction to basic materials, methods, and techniques of painting. Primary medium used is acrylic, and other painting media may also be introduced. Emphasizes basic skills in painting plus individual creative development. *Preq:* ART 151, 153, 205 (Visual Arts majors); ART 103 (non-Art Majors); ARCH 152 (Architecture majors); LARCH 152 (Landscape Architecture majors); or consent of instructor.

ART 209 Beginning Sculpture 3(0,6) Studio course investigating the meaning of sculpture through traditional and nontraditional approaches. Establishes a working knowledge of material and process in several media. Personal expression is encouraged and enhanced by employment of problem-solving techniques. Static, temporal, installation, and site specific sculpture is explored. *Preq:* ART 151, 152, 153, 154, 205 (Visual Arts majors); ART 103 (non-Art majors); ARCH 152 (Architecture majors); LARCH 152 (Landscape Architecture majors); or consent of instructor.

ART 211 Beginning Printmaking 3(0,6) Studio course introducing basic techniques of relief printing, intaglio, lithography, silkscreen, and papermaking. Each semester concentrates on two or three of these techniques. Coursework integrates print-making processes and creativity. *Preq:* ART 151, 152, 153, 154, 205 (Visual Arts majors); ART 103 (non-Art majors); ARCH 152 (Architecture majors); LARCH 152 (Landscape Architecture majors); or consent of instructor.

ART 213 Beginning Photography 3(0,6) Introduction to the use of photography as an art medium. Lectures and studio work cover the utilization of the camera, processing, and printing in black and white, with emphasis on perception and creative expression. *Preq:* ART 151, 152, 153, 154, 205 (Visual Arts majors); ART 103 (non-Art majors); ARCH 152 (Architecture majors); LARCH 152 (Landscape Architecture majors); or consent of instructor.

ART 215 Beginning Graphic Design 3(0,6) Introduction to fundamental techniques, concepts, and principles of visual communication. Through a series of projects and studio work, students explore techniques of communication through the use of type design, typography, photography, illustration, symbolism, and product design. Individual creative development is stressed. *Preq:* ART 151, 152, 153, 154, 205 (Visual Arts majors); ART 103 (non-Art majors); ARCH 152 (Architecture majors); LARCH 152 (Landscape Architecture majors); or consent of instructor.

ART 217 Beginning Ceramics 3(0,6) Basic studio course introducing ceramic arts through its various processes and techniques. Hand building methods as well as throwing on the potter's wheel are developed. Weekly projects emphasize imagination, self-expression, and skill development. Ceramic history is introduced through slide lectures. *Preq:* ART 151, 152, 153, 154, 205 (Visual Arts majors); ART 103 (non-Art majors); ARCH 152 (Architecture majors); LARCH 152 (Landscape Architecture majors); or consent of instructor.

ART 221 Beginning New Media 3(0,6) Explores new media art practices and ideas. Digital tools and processes are explored relative to drawing, painting, printing, bookmaking, and photography. Introduces new media as a context of new collective, interactive, and social modes of art production. *Preq:* ART 106, 151, 152, or consent of instructor.

ART 223 Woodworking Studio 3(0,6) Introduces woodworking explorations in sculpture and furniture design emphasizing technical understanding and creative application of woodworking processes and methodologies. Students experiment with wood as a vehicle for personal expression and thematic development and conduct research on the historical impact of woodworking in the visual arts. *Preq:* ART 151, ART 152 or ARCH 152, or LARCH 152, or consent of instructor.

ART 305 Intermediate Drawing 3(0,6) Presents drawing problems and processes directed toward the production of thematically driven projects. Exploration of diverse drawing media. Emphasizes further development of drawing skills, relationships of materials/techniques to subject matter, and the study of contemporary issues in drawing. *Preq:* ART 205 or consent of instructor.

ART 307 Painting 3(0,6) Continuation of ART 209 with increased emphasis on personal expression and growth in technical competence. Some study of painting history is included in studio activity. *Preq:* ART 207 or consent of instructor.

ART 308 Painting Research I 1-3(0,2-6) Continuation of ART 307. Technical and conceptual research in painting to further develop self-expression. Special projects are developed in consultation with instructor. May be repeated for a maximum of five credits. *Preq:* ART 307 or consent of instructor.

ART 309 Sculpture 3(0,6) Continuation of ART 209 with increased emphasis on personal expression and content of work. Further exploration of materials and processes, including an introduction to foundry casting and advanced welding techniques. Individual investigation into current and historical aspects of sculpture is required. *Preq:* ART 209 or consent of instructor.

ART 310 Sculpture Research I 1-3(0,2-6) Continuation of ART 309. Technical and conceptual research in sculpture to further develop self-expression. Special projects are developed in consultation with instructor. May be repeated for a maximum of five credits. *Preq:* ART 309 or consent of instructor.

ART 311 Printmaking 3(0,6) Continuation of processes in beginning printmaking emphasizing expanding the range and depth of technique. The relationship of technique and process to creative idea development is emphasized. *Preq:* ART 211 or consent of instructor.

ART 312 Printmaking Research I 1-3(0,2-6) Continuation of ART 311. Technical and conceptual research in printmaking to develop self-expression. Special projects are constructed in consultation with instructor. May be repeated for a maximum of five credits. *Preq:* ART 311 or consent of instructor.

ART 313 Photography 3(0,6) Continuation of ART 213. Advanced techniques and more diverse types of film and paper are used in making images of personal and expressive nature. The design and construction of a view camera, printing in color, and multiple imagery may also be included. *Preq:* ART 213 or consent of instructor.

ART 314 Photography Research I 1-3(0,2-6) Continuation of ART 313. Technical and conceptual research to develop personal and expressive work in photography. Projects are chosen in consultation with instructor. May be repeated for a maximum of five credits. *Preq:* ART 313 or consent of instructor.

ART 315 Graphic Design 3(0,6) Continuation of concepts and techniques introduced in ART 215 with emphasis on more applied projects. Individual creative solutions are emphasized. *Preq:* ART 215 or consent of instructor.

ART 317 Ceramic Arts 3(0,6) Continuation of skill development leading to more challenging projects and independent efforts. Further exposure to ceramic history and ceramic technology is presented. *Preq:* ART 217 or consent of instructor.

ART 318 Ceramics Research I 1-3(0,2-6) Continuation of ART 317. Technical and conceptual research in ceramics for the purpose of self-expression. Projects are constructed in consultation with instructor. May be repeated for a maximum of five credits. *Preq:* ART 317 or consent of instructor.

ART 321 New Media Art II 3(0,6) Intermediate-level course that introduces students to time-based art practices such as video art, installation, and performance art forms. Through regularly scheduled studio projects, readings, and screenings, students develop video, installation, and motion graphic techniques, and receive a historical overview of time-based art practices. *Preq:* ART 221 or consent of instructor.

ART 323 Digital Sculpture 3(0,6) Studio course covering digital processes applied to making sculpture. Explores digital media as a resource for creative development, creating digital renderings of sculptures, and the fabrication of models and sculptures using CNC technology. *Preq:* ART 209 and 321 or consent of instructor.

ART 405, 605 Advanced Drawing 3(0,6) Advanced level studies of drawing which explore the synthesis of refined drawing skills and philosophies of art. Students' understanding of drawing as a form of art is developed through studio practice augmented by critiques, demonstrations, lectures, field trips, and independent research. *Preq:* ART 305 or consent of instructor.

ART 407, 607 Advanced Painting 3(0,6) Advanced studio course in painting. Students select painting media and develop a strong direction based on prior painting experience. Includes study of contemporary painters and directions. *Preq:* ART 307 or consent of instructor.

ART 409, 609 Advanced Sculpture 3(0,6) Intensive independent studio concentration to further develop personal direction and content. Emphasizes continued investigation of sculptural context, materials and processes, and relative historical research. *Preq:* ART 309 or consent of instructor.

ART 411, 611 Advanced Printmaking 3(0,6) Culmination of process, techniques, and individual development. Students are expected to have mastered process and technique for the benefit of the image produced. Creativity and self-expression are highly emphasized as students select a process for concentrated study. *Preq:* ART 311 or consent of instructor.

- ART 413, 613 Advanced Photography 3(0,6)** Continuation of ART 313. Advanced problems in photography. *Preq:* ART 313 or consent of instructor.
- ART 415 Advanced Graphic Design 3(0,6)** Continuation of ART 315. Personal expression through communication techniques is further explored. Individual projects are emphasized. *Preq:* ART 315 or consent of instructor.
- ART 416 Advanced Media Art: Interactive Objects and Environments 3(0,6)** Students apply advanced media art production skills to create objects and environments that respond to user input or interaction. Tools used may include, but are not limited to, microcontrollers, sensors, RFID systems and electronic circuits, as well as traditional input devices. *Preq:* ART 321.
- ART 417, 617 Advanced Ceramic Arts 3(0,6)** Students are directed toward further development of ideas and skills. Glaze calculation and firing processes are incorporated to allow for a dynamic integration of form and ideas. *Preq:* ART 317 or consent of instructor.
- ART 420, 620 Selected Topics in Art 1-3(0,6-9)** Intense course in studio art. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Senior standing or consent of instructor.
- ART 421 Two-Dimensional Digital Animation 3(0,6)** Exposes students to the principles of animation with traditional techniques, while incorporating the latest 2-D digital tools. Students also develop interactive animations and showcase their work via the Internet. *Preq:* ART 321 or consent of instructor.
- ART 471 Bachelor of Fine Arts Senior Studio I 3(0,6)** Individual studio project directed by an instructor and determined by the student in consultation with the instructor. Focuses on a particular studio area, concept, or theme. May be repeated for a maximum of six credits. *Preq:* Senior standing and completion of 300/400 sequence in the chosen studio area, minimum grade-point ratio of 3.0 in focus studio area, participation in senior studio interview. *Coreq:* ART 473.
- ART 472 Bachelor of Fine Arts Senior Studio II 5(0,15)** Individual studio project directed by an instructor and determined by the student in consultation with the instructor. Usually focuses upon a particular studio area, concept, or theme. *Preq:* ART 471 with a B or better.
- ART 473 Senior Seminar in Professional Career Preparation 2(2,0)** Seminar and practical guide to prepare students for entry into the professional art world. Focuses on issues concerning visual artists in the early years of their professional activities. Presents career options and practical information for the graduating senior, including portfolio development. *Coreq:* ART 471.
- ART 489 Art and Art History Internship 1-3(0,2-6)** Internship with an approved sponsoring art institution in support of professional development and best art practices. May be repeated for a maximum of six credits. *Preq:* Junior standing in Visual Arts, consent of instructor and acceptance by sponsor.

- ART 490, H490, 690 Directed Studies 1-5(0,2-10)** Study of areas in the visual arts not included in other courses or additional advanced work. Must be arranged with a specific instructor prior to registration. May be repeated for a maximum of 18 credits. *Preq:* Consent of instructor.

ART AND ARCHITECTURAL HISTORY

Professor: W. W. Lew; *Associate Professors:* A. V. Feeser, J. B. LeBlanc; *Assistant Professor:* K. Kourelis

- A A H 101, H101 Survey of Art and Architectural History I 3(3,0)** Comprehensive survey of art and architectural history of Western heritage as well as significant coverage of Asian, African, Native American, and South American art. The arts are studied within the contexts of history, geography, politics, religion, and culture. Survey includes Ancient through Gothic.
- A A H 102, H102 Survey of Art and Architectural History II 3(3,0)** Survey of Renaissance, Baroque, and Neoclassical art and architecture. Introduction to the Modern Movement in Europe and America. *Preq:* A A H 101.
- A A H 203, H203 History and Theory of Architecture I 3(3,0)** First in a two-semester sequence of special topics and issues in the history of architecture. Emphasizes architectural theory and practice in the past and present. Includes analysis of differing approaches to history: chronological, typological, thematic, phenomenological. *Preq:* A A H 102.
- A A H 204, H204 History and Theory of Architecture II 3(3,0)** Second of a two-semester sequence on special topics and issues in the history of architecture. Emphasizes typologies of the house, governmental buildings, and sacred architecture. Includes study of new directions in architectural historiography. *Preq:* A A H 203.
- A A H 205, H205 History and Theory of Art I 3(3,0)** First of a two-semester sequence on special topics and issues in the history of art. Emphasizes stylistic developments and specific art movements. Analyzes art within the larger context of social, political, and religious history. Examines art techniques and theory as they have developed. *Preq:* A A H 102.
- A A H 206, H206 History and Theory of Art II 3(3,0)** Second of a two-semester sequence on special topics and issues in the history of art. Continued emphasis on stylistic developments and art movements, with specific attention directed toward post-Renaissance art. Analyzes the influence of past history on modern. *Preq:* A A H 205.
- A A H 210, H210 Introduction to Art and Architecture 3(3,0)** One-semester lecture survey that introduces the nonmajor to an overview of art and architecture from different time periods and cultures. Students are encouraged to appreciate the contribution to art made by the great masters and to discern different styles, art techniques, and creative traditions.
- A A H 305 Contemporary Art History 3(3,0)** Study of contemporary art from World War II to the present, exploring forces that have shaped various movements and directions. *Preq:* A A H 206.
- A A H H330 Honors Colloquium 3** Undergraduate honors colloquium emphasizing interdisciplinary interpretations. Focuses on an integration of art, architecture, landscape, and city planning. *Preq:* A A H 204 or 206 or consent of instructor.
- A A H 395 Special Topics in Visual Studies Abroad I 3(3,0)** On-site exposure to art and architecture in foreign countries, coupled with lectures and study problems. Different countries may be selected for study at faculty discretion. May be taught as a compact course during the academic year with a short stay in a foreign country or during summer with extended foreign experience. May not be taken Pass/Fail. *Preq:* A A H 204 or 206 or consent of instructor.
- A A H 411, 611 Directed Research in Art History II 3(3,0)** Comprehensive studies and research of special topics not covered in other courses. Emphasis is on field studies, research activities, and current developments in art history.
- A A H 412, 612 Directed Research in Art History II 3(3,0)** Continuation of A A H 411.
- A A H 423, 623 Studies in the Art and Architecture of the Renaissance I 3(3,0)** Consideration of the visual arts and architectural monuments of the Renaissance (Western Europe from the 15th-18th centuries), with a study in depth of selected examples from the period. *Preq:* A A H 204 or 206 or consent of instructor.
- A A H 424, 624 Studies in the Art and Architecture of the Renaissance II 3(3,0)** Consideration of the visual arts and architectural monuments of the Renaissance (Western Europe from the 15th-18th centuries), with a study in depth of selected examples from the period. *Preq:* A A H 423.
- A A H 430, 630 Twentieth Century Art I 3(3,0)** Acquaints students with the major artists' monuments and issues of the Modern period in art. Through lecture/discussions and the reading of primary sources, course places the major modern movements in the context of the period (1860s-1945). *Preq:* Consent of instructor.
- A A H 432, 632 Twentieth Century Art II 3(3,0)** Overview of trends in art and architecture since World War II. Specific artists, artworks, and movements are presented in a socio/historic context with specific emphasis on the transition from a late-modernist to a post-modern perspective. *Preq:* Consent of instructor.
- A A H (PHIL) 433, 633 Issues in Contemporary Art and Philosophy 3(3,0)** See PHIL 433.

ASTRONOMY

Professors: D. H. Hartmann, M. D. Leising, B. S. Meyer; *Associate Professors:* P. J. Flower, J. R. King; *Assistant Professor:* S. Brittain

- ASTR 101 Solar System Astronomy 3(3,0)** Descriptive survey of the universe, with emphasis on basic physical concepts and the objects in our solar system. Related topics of current interest are included. For nonscience majors.
- ASTR 102 Stellar Astronomy 3(3,0)** Descriptive survey of the universe, with emphasis on basic physical concepts and galactic and extragalactic objects. Related topics of current interest are included. For nonscience majors. May not be taken by students who have completed ASTR 302.

ASTR 103 Solar System Astronomy Laboratory 1(0,2) Optional laboratory to accompany ASTR 101. Demonstrations, laboratory exercises, and planetarium visits supplement the lecture course. *Coreq:* ASTR 101.

ASTR 104 Stellar Astronomy Laboratory 1(0,2) Optional laboratory to accompany ASTR 102. Demonstrations, laboratory exercises, and planetarium visits supplement the lecture course. *Coreq:* ASTR 102.

ASTR 105 Physics of the Universe 3(3,0) Basic physics principles of Newtonian mechanics, special and general relativity, quantum mechanics, atomic structure, thermal physics, optics, and radiation physics are qualitatively and quantitatively presented. These principles are then applied to demonstrate their usefulness in understanding fundamental astrophysical objects and processes in the cosmos. *Preq:* MTHSC 105 or equivalent.

ASTR (GEOL) 220 Planetary Science 3(3,0) See GEOL 220.

ASTR 302 Stellar Astrophysics 3(3,0) Study of the basic physical concepts necessary for understanding the sun, other stars, and their evolution. Topics include star formation, stellar structure and evolution, binary stars, and observational techniques. *Preq:* PHYS 221 or consent of instructor.

ASTR 303 Galactic Astrophysics 3(3,0) Study of basic physical concepts necessary for understanding the structure of the galaxy, the motions of the stars within it, the nature of the interstellar matter, other galaxies, the large-scale structure of the universe, and the origin of the solar system. *Preq:* PHYS 221 or consent of instructor.

ASTR 475 Selected Topics in Astrophysics 1-3(0-3, 0-9) Comprehensive study of an area of astrophysics. Topics may include nucleosynthesis and stellar evolution, extragalactic distance scale, structure and evolution of galaxies, and large-scale structure of the universe. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* ASTR 302 or consent of instructor.

ATHLETIC LEADERSHIP

Lecturer: D. J. Cadorette

A L 349 Principles of Coaching 3(3,0) Investigation into the scientific basis of the coaching profession, middle and high school levels. Topics include developing a coaching philosophy, sport psychology, sport pedagogy, sport physiology, athletic administration, and risk management. Current issues regarding sportsmanship, gender equity compliance, and cultural diversity are researched and synthesized. *Preq:* Athletic Leadership minor or consent of Athletic Leadership coordinator.

A L 350 Scientific Basis of Coaching I: Exercise Physiology 3(3,0) Increases understanding of basic scientific information concerning athletic performance by using the conceptual approach. Focuses primarily on an in-depth investigation into the physiological principles that can enhance athletic performance. Includes phases of physical training as well as comprehensive evaluative techniques. *Preq:* A L 349 or consent of Athletic Leadership coordinator.

A L 352 Scientific Basis of Coaching II: Kinesiology 3(3,0) Increases understanding of basic scientific information concerning athletic movement by utilizing the conceptual approach. Deals with the basic laws of human motion necessary in evaluation of athletic movement, utilizing joint structure and anatomic landmarks as a basis for motion. *Preq:* A L 349.

A L 353 Theory of Prevention and Treatment of Athletic Injuries 3(2,3) Increases understanding of principles involved in the prevention and treatment of athletic injuries. Deals with basic anatomy, first aid, and diagnostic techniques necessary for the understanding of basic athletic training procedures. *Preq:* A L 349 or consent of Athletic Leadership coordinator.

A L 361 Administration and Organization of Athletic Programs 3(3,0) Study of modern techniques and practices used in administering athletic programs. Emphasizes areas such as practice and game organization, purchase and care of equipment, budget and finances, public relations, and legal liability in athletic programs. *Preq:* A L 349 or consent of Athletic Leadership coordinator.

A L 362 Psychology of Coaching 3(3,0) Study of psychological techniques utilized to promote maximum athletic performance. Emphasizes motivation, coaching philosophy, athletic personality, mental preparation, and goal-oriented behavior. *Preq:* A L 349 or consent of Athletic Leadership coordinator.

A L 371 Coaching Baseball 1(0,3) Increases understanding of basic technical and practical information concerning the coaching of baseball by utilizing the conceptual approach. Students study basic principles of coaching, competitive organization, and proper technical skills needed to improve athletic performances. Also covers total program development as it pertains to specific levels of competition. *Preq:* A L 349 or consent of Athletic Leadership coordinator.

A L 372 Coaching Basketball 1(0,3) Increases understanding of basic technical and practical information concerning the coaching of basketball by utilizing the conceptual approach. Students study basic principles of coaching, competitive organization, and proper technical skills needed to improve athletic performances. Also covers total program development as it pertains to specific levels of competition. *Preq:* A L 349 or consent of Athletic Leadership coordinator.

A L 373 Coaching Cross Country 1(0,3) Increases understanding of technical and practical information concerning the coaching of cross country by utilizing the conceptual approach. Students study basic principles of coaching, competitive organization, and proper technical skills needed to improve athletic performances. Also covers total program development as it pertains to specific levels of competition. *Preq:* A L 349 or consent of Athletic Leadership coordinator.

A L 374 Coaching Football 1(0,3) Increases understanding of basic technical and practical information concerning the coaching of football by utilizing the conceptual approach. Students study basic principles of coaching, competitive organization, and proper technical skills needed to improve athletic performances. Also covers total program development as it pertains to specific levels of competition. *Preq:* A L 349 or consent of Athletic Leadership coordinator.

A L 375 Coaching Soccer 1(0,3) Increases understanding of basic technical and practical information concerning the coaching of soccer by utilizing the conceptual approach. Students study basic principles of coaching, competitive organization, and proper technical skills needed to improve athletic performances. Also covers total program development as it pertains to specific levels of competition. *Preq:* A L 349 or consent of Athletic Leadership coordinator.

A L 376 Coaching Strength and Conditioning 1(0,3) Increases understanding of basic technical and practical information concerning the coaching of strength and conditioning by utilizing the conceptual approach. Students study basic principles of coaching, training programs, and equipment appraisal as a means to improve athletic performance. Also covers total program development as it pertains to specific levels of competition. *Preq:* A L 349 or consent of Athletic Leadership coordinator.

A L 377 Coaching Track and Field 1(0,3) Increases understanding of basic technical and practical information concerning the coaching of track and field by utilizing the conceptual approach. Students study basic principles of coaching, competitive organization, and proper technical skills needed to improve athletic performances. Also covers total program development as it pertains to specific levels of competition. *Preq:* A L 349 or consent of Athletic Leadership coordinator.

A L 400 Athletic Leadership Internship 0 Athletic coaching and administration internship for a minimum of 60 hours. To be taken concurrently with any other Clemson University course. To be taken Pass/Fail only. *Preq:* Current CPR certification and consent of Athletic Leadership coordinator.

A L 453, 653 Athletic Injuries: Prevention, Assessment and Rehabilitation 3(3,0) Gives students an understanding of prevention, treatment, and rehabilitation procedures of injured athletes. *Preq:* A L 349.

BIOCHEMISTRY

Professors: A. G. Abbott, W. R. Marcotte, K. Murphy, *Chair; Associate Professors:* W. Cao, J. Frugoli, H. Luo, J. Morris, K. S. Smith; *Assistant Professors:* C. F. Chen, L. Clark, F. A. Feltus, H. Kurtz, A. Lawton-Rauh, H. Liang, B. Moore, M. Sehorn, L. J. Wang; *Lecturers:* C. Ingram-Smith, M. T. Morris

BIOCH 103 Careers in Biochemistry and Genetics 1(1,0) Introduces students to biochemistry and genetics career paths, professional organizations, ethical issues, and requirements for advanced study. Also gives students training in design of a professional portfolio. Credit toward a degree will be given for only one of BIOCH 103, GEN 103. *Preq:* Freshman or Sophomore standing in Biochemistry or Genetics or consent of instructor.

BIOCH 301, H301 Molecular Biochemistry 3(3,0) Introduces the nature, production, and replication of biological structure at the molecular level and its relation to function. *Preq:* CH 223.

BIOCH 302 Molecular Biochemistry Laboratory 2(0,4) Laboratory to accompany BIOCH 301. Introduction to fundamental laboratory techniques in biochemistry and molecular biology and a demonstration of some of the fundamental principles of molecular biology discussed in BIOCH 301. *Preq:* CH 223. *Coreq:* BIOCH 301.

BIOCH 305 Essential Elements of Biochemistry 3(3,0) Introduction to structure, synthesis, metabolism and function of biomolecules in living organisms. *Preq:* CH 201 or equivalent and BIOL 103 or 110; or consent of instructor.

BIOCH 306 Essential Elements of Biochemistry Laboratory 1(0,3) Introduces students to fundamental techniques associated with tissue extraction and analysis of biomolecules. Students learn both principles and practical applications. *Preq or Coreq:* BIOCH 305.

BIOCH 406, 606 Physiological Chemistry 3(3,0) Studies chemical basis of the mammalian physiological processes of muscle contraction, nerve function, respiration, kidney function, and blood homeostasis. Discusses composition of specialized tissue such as muscle, nerve, blood, and bone and regulation of water, electrolytes, and acid-base balance. *Preq:* BIOCH 305 or organic chemistry.

BIOCH 423, 623 Principles of Biochemistry 3(3,0) Study of the chemistry of amino acids, monosaccharides, fatty acids, purines, pyrimidines, and associated compounds leads to an understanding of their properties and the relationship between structure and function that makes them important in biological processes. The use of modern techniques is stressed. *Preq:* CH 224 or equivalent.

BIOCH 431, H431, 631 Physical Approach to Biochemistry 3(3,0) Study of chemical and physical properties of amino acids, lipids, nucleic acids, sugars, and their biopolymers. Physical and mathematical analyses are correlated with biological structure and function. *Preq:* BIOCH 301 with a C or better or consent of instructor. *Coreq:* Physical chemistry.

BIOCH 432, H432, 632 Biochemistry of Metabolism 3(3,0) Study of the central pathway of carbohydrate, lipid, and nucleotide metabolism. Emphasizes bioenergetics, limiting reactions, and the regulation and integration of the metabolic pathways. *Preq:* BIOCH 423 or 431 or consent of instructor.

BIOCH 433, 633 General Biochemistry Laboratory I 2(0,4) Experiments to illustrate current methods used in biochemical research. *Preq:* Concurrent enrollment in BIOCH 423 or 431.

BIOCH 434, 634 General Biochemistry Laboratory II 2(0,4) Continuation of BIOCH 433. *Preq:* Concurrent enrollment in BIOCH 432.

BIOCH 436, H436, 636 Molecular Biology: Genes to Proteins 3(3,0) Examines how nucleic acids and proteins are synthesized in prokaryotic and eukaryotic cells. Designed for students interested in biochemistry, cell biology, molecular biology, and cell physiology. *Preq:* BIOCH 301 and GEN 302, or consent of instructor.

BIOCH (GEN) 440, H440, 640 Bioinformatics 3(3,0) See GEN 440.

BIOCH 443, 643 Biochemical Basis of Disease 3(3,0) Topics in heritable human metabolic disorders, including clinical features and newborn screening, genetic testing, the biochemical basis, and treatment. *Preq:* BIOCH 301, GEN 302, or consent of instructor.

BIOCH 490 Selected Topics in Biochemistry I 4(0-4,0-9) Comprehensive study of selected topics not covered in other courses. May be repeated for a maximum of eight credits, but only if different topics are covered. *Preq:* Junior standing or consent of instructor.

BIOCH 491, H491 Directed Research in Biochemistry I 8(0,3-24) Orientation in biochemical research (i.e., experimental planning, execution, and reporting). May be repeated for a maximum of eight credits.

BIOCH 493, H493 Senior Seminar 2(2,0) Analysis and discussion of papers from the primary literature in the life sciences particularly in biochemistry. Students find pertinent articles in the primary literature and present and analyze the selected reading.

BIOENGINEERING

Professors: K. J. L. Burg, R. L. Dooley, R. Figliola, A. Guiseppe-Elie, M. LaBerge, *Chair*; R. A. Latour Jr., N. R. Vyavahare, G. Zhang; *Associate Professors:* R. W. Blob, B. Z. Gao, S. W. Harcum, A. Ramamurthi, C. K. Webb, X. Wen; *Assistant Professors:* F. Alexis, L. Benson, D. Dean, J. DesJardins, J. Nagatomi, D. Simionescu, A. Vertegel, H. Yao, N. Zhang

BIO E 101 Biology for Bioengineers 1(1,0) Provides basic introduction to fundamental principles of molecular and cellular biology. *Preq:* CH 101.

BIO E 201 Introduction to Biomedical Engineering 3(3,0) Provides engineering, biological, and physical science students with an overview of the replacement of human body parts and the problems related to artificial devices. *Preq:* BIO E 101 or BIOL 103 or 110; CH 102; or consent of instructor.

BIO E 302 Biomaterials 3(2,3) Study of metallic, ceramic, and polymer materials used for surgical and dental implants; materials selection, implant design, physical and mechanical testing; corrosion and wear in the body. In addition, physical and mechanical properties of tissue as related to microstructure are studied. *Preq:* BIO E 201, C M E 210, CH 201, or consent of instructor.

BIO E 320 Biomechanics 3(3,0) Study of relation between biological and mechanical functions of musculoskeletal tissues such as bone, ligaments, muscles, cartilage, etc.; mechanics of human joints; analysis of implants and implant failure. *Preq:* E M 201, MTHSC 208.

BIO E 321 Biofluid Mechanics 3(3,0) Introduces mechanics of biological fluids (e.g., blood, synovial fluid and physiological solutions) with an emphasis on the formation of biological problems within the context of (1) kinematics, (2) the concept of stress, (3) linear momentum balance, (4) constitutive relations and (5) boundary conditions. *Preq:* BIO E 320.

BIO E 370 Bioinstrumentation and Bioimaging 3(2,3) Introduction of fundamental topics in bioinstrumentation and bioimaging focused on the acquisition and monitoring of vital signals. Basic principles for the selection and appropriate use of instruments for solving bioengineering and medical problems such as microscopy, magnetic resonance imaging, and ultrasounds, among others, are addressed. *Preq:* E C I 202 or 307; and MTHSC 208; or consent of instructor

BIO E 400 Senior Seminar 1(1,0) Addresses problems to be encountered by bioengineering graduates in professional practice. Invited lecturers and faculty provide lectures and demonstrations. Pertinent information on job interview skills, career placement and guidance, professional registration, professional ethics in bioengineering, entrepreneurship and patents, and business management are provided. To be taken Pass/Fail only. *Preq:* Senior standing in Bioengineering.

BIO E 401 Bioengineering Design Theory 3(3,0) Introduces principles of engineering design and applies them to the design of medical devices. Covers materials selection, fabrication processes, performance standards, cost analysis, and design optimization. Students defend a design project proposal in written and oral form before a faculty jury. *Preq:* BIO E 302 or consent of instructor.

BIO E 402 Biocompatibility 3(2,3) Guides students through the theory and practice of determining compatibility of biomaterials and medical devices as required by the FDA. Hands-on experiments emphasize host-implant interactions such as toxicity towards tissues using specific techniques, including cell culture, implantation of biomaterials in experimental animals and histopathology. *Preq:* BIO E 302 and BIOSC 461 or consent of instructor

BIO E 403 Applied Biomedical Design 3(1,6) Creative application of bioengineering and design principles to solving clinically relevant design problems. Team-based development, construction and evaluation of design prototypes in accordance with design theory. Students present results to faculty jury and external collaborators through written reports and oral presentations. *Preq:* BIO E 401, or consent of instructor

BIO E 412, 612 Orthopaedic Engineering and Pathology 3(3,0) Interdisciplinary study of clinical orthopaedic cases (bone growth, bone remodeling, osteoarthritis, implant fixation and joint replacements); biomechanical, biomaterials, tribology and clinical diagnosis of failed implants (total joint replacements, fracture fixation and spinal instrumentation); basic concepts of orthopaedic pathology for engineers. *Preq:* BIO E 302, 320, BIOSC 315.

BIO E (C M E) 415, H415, 615 Research Principles and Concepts 1(1,0) Introduces seniors and graduate students to principles and practices of scientific research. Topics include developing scientific concepts, developing projects, pursuing research, collaborating in multidisciplinary teams, patenting and publishing technical and scientific information, and reviewing professional and ethical standards of performance. To be taken Pass/Fail only.

BIO E 420 Sports Engineering 3(3,0) Study of engineering principles involved in sports, body systems in human motion, analysis of gait, basic performance patterns in athletic movements, performance improvements, design of sports equipment. *Preq:* BIO E 302 and 320 or consent of instructor.

BIO E 423, 623 Cardiovascular Engineering and Pathology 3(3,0) Medical and bioengineering aspects of artificial cardiovascular and vascular devices; physiology and pathological aspects of patients with need for such devices; diagnostic techniques and surgical management of diseases and pathology; design aspects of current devices and selection; state of the art in experiments and human clinical trials. *Preq:* BIO E 302, 320, 370, BIOSC 315.

BIO E 440, 640 Biotechnology for Bioengineers 3(3,0) Explores the principles necessary to use microorganisms, tissue culture, and enzymes in bioengineering applications, including molecular techniques, fermentation, process scale-up, purification processes, and FDA regulations. Emphasizes production of biopharmaceuticals derived from recombinant systems, including uses in medical systems. *Preq:* BIOCH 305 or consent of instructor.

BIO E 448 Tissue Engineering 3(2,3) Explores the application of engineering principles toward the development of biologically based substrates that restore, maintain, or improve tissue function. Topics include biodegradable scaffolds, wound healing and tissue repair, cell-matrix interactions, immunology and biocompatibility, stem cells. *Preq:* BIO E 302, BIOSC 315 and 461, or consent of instructor.

BIO E 450, H450 Special Topics in Bioengineering 1-4(1-4,0) Comprehensive study of a topic of current interest in the field of biomedical engineering under the direct supervision and guidance of a faculty member. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of instructor.

BIO E 451 Creative Inquiry—Bioengineering 1-3(1-3,0) Disciplinary and multidisciplinary team research projects with the goal of developing the students' skills in literature research, engineering design, and data analysis. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

BIO E 460 International Special Research Topics in Bioengineering 3(0,9) Comprehensive study and research exposure relating to bioengineering research topics at an international institution through the Bioengineering study abroad program. Students are exposed to laboratory and research methods while under the direct supervision and guidance of approved international mentors. *Preq:* Consent of instructor.

BIO E 461 International Study in Bioengineering 3(3,0) Introduction to selected bioengineering topics through participation in international study abroad summer programs. Offers an international study experience to undergraduates through lectures, guest speakers, tours, and/or laboratory exposure on a selected bioengineering topic chosen annually by the department. *Preq:* Consent of instructor.

BIO E 471, 671 Biomedical Imaging in Biophotonics 3(3,0) Biophotonics is an interdisciplinary subject of applying photonics to study biological samples from individual cells to the entire body. Introduces fundamental and frontier topics in optical imaging aspects of biophotonics for senior-level undergraduates and graduate students to gain the ability to solve bioimaging-related biomedical problems. *Preq:* MTHSC 208; PHYS 221; E C E 320; or consent of instructor.

BIO E 476 Biosurface Engineering 3(2,3) Study of how surface design influences the interactions of biomolecules with biomaterials and how this in turn influences implant biocompatibility. Laboratory addresses both the theory and application of various analytical instruments commonly used in bioengineering to characterize biomaterials surfaces and investigate biomolecule-surface interactions. *Preq:* Senior standing in Bioengineering, BIOCH 305.

BIO E 482, 682 Biomaterial Implantology 3(2,3) Provides training in the planning and conduct of experimental surgery, including laws and regulations; institutional requirements; selection of animal models; ethical considerations of animal research; preparation of animals for surgery; general and special surgical techniques; aseptic surgical techniques; and basic and applied instrumentation. *Preq:* Junior standing in Bioengineering.

BIO E 490 Internship 1(0,3) Observation and assignment in a medical school, dental school, hospital, regulatory agency, or industrial department. May be repeated for a maximum of two credits. *Preq:* Senior standing in Bioengineering, consent of department chair.

BIO E 491, H491 Mentored Research in Bioengineering 1-6(0,3-18) Mentored research training for undergraduate students working with a faculty advisor, including literature review, experimental design, research documentation, and presentation of results. May be repeated for a maximum of six credits. Honors students must take six credits under a single advisor and write an honors thesis. *Preq:* Consent of instructor.

BIOLOGICAL SCIENCES

Professors: P.H. Adler, R.E. Ballard, W. Chen, G.W. Eidson, V. S. Gallicchio, S. J. Klaine, M. B. Ptacek, C. D. Rice, B. J. Speziale, T. P. Spira, L. A. Temesvari, Y. Wei, A. P. Wheeler, *Chair; Associate Professors:* L. J. Bain, W. S. Baldwin, R. W. Blob, J. J. Hains, A. S. Mount, S. A. Sparace, D. W. Tonkyn, M. W. Turnbull, P. van den Hurk, X. Yu; *Assistant Professors:* D. G. Bielenberg, S. C. Chapman, M. J. Childress, S. J. DeWalt, Y. Dong, N. R. Espinoza, T. E. Higham, J. L. Kerrigan, P. B. Marko, A. L. Moran, K. S. Paul, L. G. Rapaport; *Senior Lecturers:* J. R. Cummings, T. L. McNutt-Scott; *Lecturers:* K. L. Ickes, R. C. Hardwick, P. D. McMillan, H. P. Walker; *Adjunct Instructor:* J. M. Denton

BIOSC 101 Frontiers in Biology I 1(1,0) Introduces Biological Sciences majors to University career and library services, evaluation of computer program proficiency, Web page development, Biological Sciences emphasis areas, and Biological Sciences faculty. Students initiate their own Web-based student portfolios, which showcase their skills and experiences (e.g., résumés, accomplishments, and work samples) during their undergraduate programs. *Coreq:* BIOL 103/105 or 110 or consent of course coordinator.

BIOSC 102 Frontiers in Biology II 1(1,0) Introduces Biological Sciences majors to recent advances in organismal and evolutionary biology. Topics include ecology, evolution, behavior, and organismal biology. *Preq:* BIOL 103/105 or 110 or consent of course coordinator.

BIOSC 200 Biology in the News 3(3,0) For non-science majors. Students examine current topics of biology appearing in newspapers and other current media. Uses a problem-based learning approach, with students working as teams and individually on areas of interest identified by the class. *Preq:* ENGL 103, General Education Natural Science Requirement.

BIOSC 203 Environment, Energy, and Society 3(3,0) Examines power and energy production, the resultant environmental effects, and the relationship between this technology and society. Introduces historical and contemporary sources of energy and power; the economic, social, and political forces important for types and patterns of development; and the resultant impacts to ecosystems and the environment.

BIOSC 205 Plant Form and Function 3(3,0) Introductory course for students majoring in plant sciences. Integrates lecture and laboratory and emphasizes fundamental structures and functions of higher plants. *Preq:* BIOL 103/105 or consent of instructor.

BIOSC 206 Plant Form and Function Laboratory 1(0,3) Laboratory for BIOSC 205. *Preq or Coreq:* BIOSC 205 or consent of instructor.

BIOSC 210 Introduction to Toxicology 3(3,0) Acquaints students with the field of toxicology, integrates the science of toxicology with regulatory policy, and demonstrates its impact on our daily lives. *Preq:* BIOL 103/105, 110, or consent of instructor.

BIOSC 222 Human Anatomy and Physiology I 4(3,2) Basic introductory course in integrated human anatomy and physiology covering cells and tissues; integumentary, skeletal, muscular, and nervous systems; sensory organs. Physiology is stressed. Structured primarily for Nursing and other health-related curricula. *Preq:* BIOL 103/105 or 110; CH 101 and 102, or 105 and 106.

BIOSC 223 Human Anatomy and Physiology II 4(3,2) Continuation of BIOSC 222 covering endocrine, reproductive, cardiovascular, lymphatic, respiratory, urinary, and digestive systems; fluid and electrolyte balance. Physiology is stressed. *Preq:* BIOSC 222 or consent of instructor.

BIOSC (ENT) 301 Insect Biology and Diversity 4(3,3) See ENT 301.

BIOSC 302, H302 Invertebrate Biology 3(3,0) In-depth survey and comparison of free-living invertebrate animals emphasizing functional anatomy, development, and evolutionary relationships. *Preq:* Introductory two-semester biology sequence with laboratory. *Coreq:* BIOSC 306.

BIOSC 303, H303 Vertebrate Biology 3(3,0) Comprehensive survey of vertebrate animals, including their taxonomy, morphology, evolution, and selected aspects of the natural history and behavior. *Preq:* Introductory two-semester biology sequence with laboratory.

BIOSC 304, H304 Biology of Plants 3(3,0) Survey of the major groups of plants, their biology, diversity, and evolution. *Preq:* BIOL 104/106 or 111 of BIOSC 205. *Coreq:* BIOSC 308.

- BIOSC 305, H305 Biology of Algae and Fungi 3(3,0)** Introduction to the biology of the major groups of algae and fungi. Emphasizes how select representatives of the algae and fungi are adapted to their environment through structural, physiological, and life-cycle modifications. *Preq:* BIOL 104/106 or 111 or BIOSC 205.
- BIOSC 306 Invertebrate Biology Laboratory 1(0,3)** Survey and comparison of the biology of living invertebrates, examples of which are drawn primarily from the southeastern coast of the United States. *Preq:* Introductory two-semester biology sequence with laboratory. *Coreq:* BIOSC 302.
- BIOSC 307 Vertebrate Biology Laboratory 1(0,3)** Comparative and phylogenetic study of the gross morphology of vertebrates. *Preq or Coreq:* BIOSC 303.
- BIOSC 308 Biology of Plants Practicum 1(0,3)** Laboratory exercises that explore the major groups of plants, their biology, diversity, and evolution. *Preq or Coreq:* BIOSC 304.
- BIOSC 309 Algae/Fungi Practicum 1(0,3)** Practice in the manipulation and examination of selected algae and fungi, with emphasis on culture techniques and examination of the structure and adaptations of the algae and fungi to different environments. *Preq or Coreq:* BIOSC 305.
- BIOSC (W F B) 313 Conservation Biology 3(3,0)** See W F B 313.
- BIOSC 315 Functional Human Anatomy 4(3,3)** Introduction to the anatomical structures associated with all organ systems found in the human body at both the gross and microscopic level. Basic physiology is integrated to assist with understanding the function of the anatomical systems. *Preq:* BIOL 103/105 or 110 or consent of instructor.
- BIOSC 316 Human Physiology 4(3,3)** Study of the functional processes associated with the various organ systems in the human body. Students develop a basic understanding of the important and fundamental concepts in human physiology and how organ systems maintain homeostasis. *Preq:* One year of introductory biology and introductory chemistry or consent of the instructor.
- BIOSC 320 Field Botany 4(2,4)** Introductory study of the taxonomy, ecology, and evolution of plants in their natural environment with an emphasis on identification and characteristics of representative species and plant communities in the Carolinas. Includes one or two required Saturday field trips. *Preq:* BIOL 104/106, 111, or BIOSC 205, or consent of instructor.
- BIOSC 335 Evolutionary Biology 3(3,0)** Introduction to basic concepts and underlying principles of modern evolutionary biology. Topics include a historical overview of evolutionary theories, elementary population genetics, principles of adaptation, speciation, systematics and phylogenetic inference, fossil record, biogeography, molecular evolution, and human evolution. *Preq:* GEN 302 or equivalent.
- BIOSC (PL PH) 340 Plant Medicine and Magic 3(3,0)** See PL PH 340.
- BIOSC (ANTH) 351 Biological Anthropology 3(3,0)** See ANTH 351.
- BIOSC (ANTH) 353 Forensic Anthropology 3(3,0)** See ANTH 353.
- BIOSC 394, H394 Selected Topics in Creative Inquiry I 3(1,6)** Disciplinary and multidisciplinary group research projects develop the student's ability to discover, analyze, and evaluate data. Students are required to document their research activities in their portfolios. May be repeated for a maximum of six credits. Honors students must take at least six credits over a two-semester period with the same research advisor and write an honors thesis. These credits may include BIOSC 394, BIOSC 494 or both. *Preq:* Consent of instructor.
- BIOSC (ENT) 400, H400, 600 Insect Morphology 4(3,3)** See ENT 400.
- BIOSC 401, H401, 601 Plant Physiology 3(3,0)** Relations and processes pertaining to maintenance, growth, and reproduction of plants, including absorption of matter and energy, water relations of the plant, utilization of reserve products and liberation of energy. *Preq:* BIOL 104/106 or 111 or BIOSC 205 and CH 102. *Coreq:* BIOSC 402.
- BIOSC 402, 602 Plant Physiology Laboratory 1(0,3)** Laboratory exercises and experiments designed to indicate the relations and processes which pertain to maintenance, growth, and reproduction of plants, including absorption of matter and energy, water relations of the plant, utilization of reserve products, and liberation of energy. *Coreq:* BIOSC 401.
- BIOSC (GEN) 405, H405, 605 Molecular Genetics of Eukaryotes 3(3,0)** See GEN 405.
- BIOSC 406, H406, 606 Introductory Plant Taxonomy 3(3,0)** Introduction to the basic principles and concepts of plant systematics with emphasis on the plants of South Carolina. *Preq:* BIOL 104/106 or 111 or BIOSC 205. *Coreq:* BIOSC 407.
- BIOSC 407, 607 Plant Taxonomy Laboratory 1(0,3)** Introduction to basic techniques of plant taxonomy with laboratory and field emphasis on the flora of South Carolina. *Coreq:* BIOSC 406.
- BIOSC 408, H408, 608 Comparative Vertebrate Morphology 3(3,0)** Phylogeny and diversity of vertebrates and study of their comparative morphology, leading to an understanding of the relationships and functioning of living organisms. *Preq:* BIOL 104/106 or 111. *Coreq:* BIOSC 409.
- BIOSC 409, H409, 609 Comparative Vertebrate Morphology Laboratory 2(0,5)** Comparative anatomy of representative vertebrates; methods used in preparing specimens for study and display. *Coreq:* BIOSC 408.
- BIOSC 410, 610 Limnology 3(3,0)** Detailed introduction to the physical, chemical, and biological interrelationships that characterize inland water environments. A fundamental approach to the interactions of components of the environment is developed at a theoretical level. *Preq:* Junior standing in a life science or consent of instructor.
- BIOSC 411, H411, 611 Limnological Analyses 2(1,2)** Examines a broad range of topics covered with both standing and running fresh waters. About one-third of the laboratory exercises address the major physical components of lakes and streams. The remainder provides rationale and methods for quantitative analyses of biota, as well as some integrated analyses of whole ecosystems. *Preq or Coreq:* BIOSC 410 or 443.
- BIOSC (EN R) 413, 613 Restoration Ecology 3(3,0)** See EN R 413.
- BIOSC (AVS, MICRO) 414, H414, 614 Basic Immunology 4(3,3)** See MICRO 414.
- BIOSC (ENT) 415, 615 Insect Taxonomy 3(1,6)** See ENT 415.
- BIOSC (GEN) 416, 616 Recombinant DNA 3(3,0)** See GEN 416.
- BIOSC 417, 617 Marine Biology 3(3,0)** Survey of the organisms that live in the sea and their adaptations to the marine environment. Emphasizes characteristics of marine habitats, organisms, and the ecosystems. *Preq:* BIOL 104, 106, 111, or consent of instructor.
- BIOSC (GEN, MICRO) 418, 618 Biotechnology I: Nucleic Acids Techniques 4(2,4)** See GEN 418.
- BIOSC 420, H420, 620 Neurobiology 3(3,0)** Broad background in neurobiology. Topics include neuroanatomical structure-function; conduction in the neuron; neurite growth and development; neuromuscular junction; chemistry, physiology, and pharmacology of specific neurotransmitters and receptors; visual process; axoplasmic transport; hypothalamic-pituitary regulation; theories of behavior; theories of learning and memory. *Preq:* BIOCH 301 or 305 or consent of instructor.
- BIOSC (PL PA) 425, 625 Introductory Mycology 3(3,0)** Introduction to the biology of all the groups of fungi and some related organisms, with considerations of the taxonomy, morphology, development, physiology, and ecology of representative forms. *Preq:* BIOL 104/106 or 111 or BIOSC 205. *Coreq:* BIOSC (PL PA) 426.
- BIOSC (PL PA) 426, 626 Mycology Practicum 2(1,3)** Application of the principles of mycological techniques, microscopic study of fungi. Examples from all major groups of fungi are included. *Coreq:* BIOSC (PL PA) 425.
- BIOSC 428, 628 Quantitative Biology 4(3,3)** Applies quantitative methods to a wide range of biological problems. Main focus is on building modeling skills using population, physiological, genetic, and evolutionary problems. Also includes a review of statistical principles and introduces basic bioinformatics techniques. *Preq:* BIOL 103/104, 111, or equivalent; and MTHSC 108 or equivalent.
- BIOSC 432, H432, 632 Animal Histology 3(3,0)** Structural and functional study of the basic tissues of animals and tissue makeup of organs. Emphasizes light microscopy level with selected tissue studied at the electron microscope level. *Preq:* BIOSC 303 or consent of instructor. *Coreq:* BIOSC 433.
- BIOSC 433, H433, 633 Animal Histology Laboratory 2(1,2)** Microscopic examination of basic animal tissue types and the tissue makeup of organs which comprise systems. *Coreq:* BIOSC 432.
- BIOSC 434 Biological Chemistry Laboratory Techniques 2(1,3)** Theory and application of some of the routine tools and techniques used in biological chemistry. Lectures introduce laboratory theory and provide additional laboratory instructions; discuss results; and conduct student evaluations. Laboratory periods are used to conduct each activity. *Preq:* BIOCH 305 or equivalent, or consent of instructor.
- BIOSC (ENT) 436, 636 Insect Behavior 3(2,3)** See ENT 436.

BIOSC 440, H440, 640 Developmental Animal Biology 3(3,0) Events and mechanisms responsible for the development of multicellular animals. Gametogenesis, fertilization, embryonic development, cellular differentiation, morphogenesis, larval forms and metamorphosis, asexual reproduction, regeneration, malignancy, and aging are analyzed in terms of fundamental concepts and control processes. *Preq:* BIOCH 301 or 305 or consent of instructor. *Coreq:* BIOSC 450.

BIOSC 441, H441, 641 Ecology 3(3,0) Study of basic ecological principles underlying the relationships between organisms and their biotic and abiotic environments. Includes physiological, population, and community ecology, with applications of each to human ecological concerns. *Preq:* BIOL 104/106, 111, BIOSC 205, or consent of instructor.

BIOSC 442, H442, 642 Biogeography 3(3,0) Study of patterns of distribution of plants and animals in space and time. *Preq:* BIOSC 302 or 303 and 304 or 305 or consent of instructor.

BIOSC 443, 643 Freshwater Ecology 3(3,0) Study of basic ecological principles and concepts as they apply to freshwater environments: rivers and streams, wetlands, lakes and ponds, and reservoirs. *Preq:* Junior standing in a life science or consent of instructor.

BIOSC 444, 644 Freshwater Ecology Laboratory 2(1,2) Laboratory-based course providing a synthesis of major components of freshwater ecosystems. Activities are hypothesis driven and relate to each other to form an overall synthesis of the field. Hands-on experience allows engagement in creative inquiry. *Preq or Coreq:* BIOSC 443 or equivalent or consent of instructor.

BIOSC 445, H445, 645 Ecology Laboratory 2(1,2) Modern and classical approaches to the study of ecological problems discussed in BIOSC 441. Students are introduced to field, laboratory and computer-based analyses of plant and animal populations and communities. *Preq or Coreq:* BIOSC 441.

BIOSC 446, H446, 646 Plant Ecology 3(3,0) Ecology of plants in relation to their biotic and abiotic environments. Individual organisms, populations, and communities are considered with an emphasis on seed plants in terrestrial environments. *Preq:* BIOL 104/106, 111, BIOSC 205, or consent of instructor.

BIOSC 447, H447, 647 Plant Ecology Laboratory 2(1,2) Experimental and observational approach to addressing principles discussed in BIOSC 446. Students are introduced to field and laboratory methods involving individual organisms, populations, and communities. *Preq or Coreq:* BIOSC 446 or consent of instructor.

BIOSC 450, H450, 650 Developmental Biology Laboratory 2(1,2) Examines a broad range of topics concerned with the development of multicellular animals such as gametogenesis, fertilization, embryonic development, cell differentiation, morphogenesis, larval metamorphosis, and regeneration. Laboratory exercises provide the rationale and methods for the descriptive and experimental analysis of development in representative invertebrates and vertebrates. *Preq or Coreq:* BIOSC 440 or equivalent.

BIOSC 452, 652 Plant Anatomy and Morphology 3(3,0) Study of the anatomy, reproduction, and phylogenetic relationships of vascular plants. *Preq:* BIOL 104/106, 111, BIOSC 205, or consent of instructor.

BIOSC 453, 653 Plant Anatomy and Morphology Laboratory 2(1,2) Laboratory focusing on the anatomy, reproduction, and phylogenetic relationships of vascular plants. *Coreq:* BIOSC 452.

BIOSC 454, 654 Plant Virology 4(3,3) Study of plant viruses: their morphology, biochemistry, purification, and transmission; symptoms resulting from virus infection; virus vector relationships. Serological and nucleic acid hybridization procedures. Diagnosis of viral diseases and the identification of causal agents. Replication of plant viruses, the interaction between viral host and plant genome. Control of plant viral diseases. *Preq:* BIOCH 301, MICRO 305, or consent of instructor.

BIOSC (ENT) 455, H455, 655 Medical and Veterinary Entomology 3(2,3) See ENT 455.

BIOSC (MICRO) 456, H456, 656 Medical and Veterinary Parasitology 3(3,0) Introduction to parasitism in the animal kingdom. Emphasizes basic and applied principles related to economically and medically important diseases. Classical and experimental approaches to the study of parasitism are examined in reference to protozoa, helminths, and arthropods. *Preq:* BIOL 104/106 or 111. *Coreq:* BIOSC 457.

BIOSC (MICRO) 457, H457, 657 Medical and Veterinary Parasitology Laboratory 2(1,2) Laboratory to reinforce material presented in BIOSC 456. Introduces students to both live and preserved human/animal parasites. Also introduces techniques used in collection, preservation, and examination of animal parasites. *Coreq:* BIOSC 456.

BIOSC 458, H458, 658 Cell Physiology 3(3,0) Study of the chemical and physical principles of cell function emphasizing bioenergetics and membrane phenomena. *Preq:* BIOCH 301 or 305 or consent of instructor.

BIOSC 459, H459, 659 Systems Physiology 3(3,0) Physiological systems of vertebrates and their homeostatic controls. Describes the function of the major physiological systems in terms of anatomical structure and chemical and physical principles. *Preq:* One year each of biology, chemistry, and physics or consent of instructor.

BIOSC 460, 660 Systems Physiology Laboratory 2(1,2) Modern and classical experimental methods are used to demonstrate fundamental physiological principles discussed in BIOSC 459. Students are introduced to computer-aided data acquisition and computer simulations of physiological function. *Preq or Coreq:* BIOSC 459.

BIOSC 461, H461, 661 Cell Biology 3(3,0) In-depth analysis of how and where intracellular and extracellular molecules control general and specific cellular functions such as gene expression, secretion, motility, signaling, cell-cycle control and differentiation. Taught and graded at a level where students are expected to infer from and integrate cellular events. *Preq:* BIOCH 301 or consent of instructor.

BIOSC 462, 662 Cell Biology Laboratory 2(1,2) Laboratory to accompany BIOSC 461. Focuses on molecular and microscopic analysis of eukaryotic cells. *Coreq:* BIOSC 461.

BIOSC 464, 664 Mammalogy 4(3,3) Origin, evolution, distribution, structure, and function of mammals, with laboratory emphasis on the mammals of the Southeast. Field trips and live trapping of mammals are required. *Preq:* BIOSC 303 or consent of instructor.

BIOSC (GEN, HORT) 465, 665 Plant Molecular Biology 3(3,0) See HORT 465.

BIOSC (ANTH) 466, 666 Evolution of Human Behavior 3(3,0) Familiarizes students with the evolutionary basis of human behavior. Examines topics such as altruism, cooperation, mating systems, parental investment, and social systems using diverse examples, from hunter-gatherer to technological societies. *Preq:* ANTH 351, BIOSC 335, 470, or PSYCH 201; or consent of instructor.

BIOSC 467 Principles of Hematology 3(3,0) Basic hematological principles as they relate to normal blood cell production, as well as in abnormal conditions that result in diseases of the hematological system. Clinical practice, ethics and controversies in hematology are discussed. *Preq:* BIOSC 461 and 462.

BIOSC 468, 668 Herpetology 3(2,3) Systematics, life history, distribution, ecology, and current literature of amphibians and reptiles. Laboratory study of morphology and identification of world families and U.S. genera, as well as all southeastern species. Field trips are required. *Preq:* BIOSC 303 or consent of instructor.

BIOSC (ENT, W F B) 469, H469, 669 Aquatic Insects 3(1,6) See ENT 469.

BIOSC 470, H470, 670 Behavioral Ecology 3(3,0) Historical and modern developments in animal behavior emphasizing the evolutionary and ecological determinants of behavior. A synthesis of ethology and comparative psychology. *Preq:* BIOSC 302 or 303 or consent of instructor.

BIOSC 471, 671 Behavioral Ecology Laboratory 2(1,2) Laboratory exercises that explore the behavior of animals. Emphasizes behavioral observation and analysis and presentation of findings in a report format. Includes a semester-long independent research project. *Preq or Coreq:* BIOSC 470 or consent of instructor.

BIOSC 472, 672 Ornithology 4(3,3) Biology of birds: their origin and diversification, adaptations, phylogeny, classification, structure and function, behavior, ecology, and biogeography. Field identification is emphasized, and field trips are required. *Preq:* BIOSC 303 or consent of instructor.

BIOSC 473, 673 History of Modern Biology 3(3,0) Examines the intellectual and social factors defining the study of life from the scientific revolution of the 1600s to the modern biological sciences. Investigates the historical origins of biological disciplines and explores the differing cultures, methodologies, and philosophical commitments of these communities. *Preq:* Introductory course in biology or consent of instructor.

BIOSC 474, 674 Primatology 4(3,3) Biology of nonhuman primates, including their evolution, taxonomy, physiology, life history, behavioral ecology and conservation. Three field trips are required, during which students conduct behavioral observations and later analyze their data and present it in report format. *Preq:* ANTH 351, BIOSC 303, 335.

BIOSC 475, H475, 675 Comparative Physiology 3(3,0) Physiological systems of invertebrates and vertebrates emphasizing environmental adaptation. Physiological principles as they relate to metabolism, thermoregulation, osmoregulation, respiration, and neural and integrative physiology. *Preq:* One year each of biology, chemistry, and physics or consent of instructor.

BIOSC 476, H476, 676 Comparative Physiology Laboratory 2(1,2) Modern classical experimental methods are used to demonstrate fundamental physiological principles discussed in BIOSC 475. Introduces students to computer-aided data acquisition and manipulation as well as computer simulations of physiological function. *Preq or Coreq:* BIOSC 475.

BIOSC 477, 677 Ichthyology 3(2,3) Systematics, life history, distribution, ecology, and current literature of fish. Laboratory study of morphology and identification of U.S. genera, as well as all southeastern species. Field trips are required. *Preq:* BIOSC 303 or consent of instructor.

BIOSC 478 Exercise Physiology 3(3,0) Introduction to the physiology of exercise. Focuses on the function and adaptations of body systems in response to exercise. Structured primarily for students interested in Prerehabilitation Sciences. *Preq:* BIOSC 222/223 or 315/316 or consent of instructor.

BIOSC 479 Kinesiology 3(3,0) Introduction to the study of human movement. Focuses on the application of biomechanical and motor control principles to human motion, including daily living, sport, and work activities. Structured primarily for students interested in Prerehabilitation Sciences. *Preq:* BIOSC 222 or 315 or consent of instructor.

BIOSC (AVS) 480, 680 Vertebrate Endocrinology 3(3,0) Introduction to the basic principles of neuro-endocrine integration and homeostatic maintenance in vertebrates. Comparative morphology and physiology of various endocrine tissues and hormone chemistry and modes of action are considered. *Preq:* BIOSC 303, organic chemistry, or consent of instructor.

BIOSC 481, 681 Web Design for the Life Sciences and Agriculture 3(2,2) Addresses basic principles and theories of Web design and site construction, including usability and accessibility considerations. Web and graphics design software are used to develop sites suitable for life science and agricultural organizations. Service-learning is used with student projects. *Preq:* AG ED 200, CP SC 120, or consent of instructor.

BIOSC 482 Laboratory Techniques for Teaching Science 3(1,6) Focuses on basic lab skills needed to plan, prepare, and conduct inquiry-based laboratories and to familiarize pre-service teachers with a variety of scientific equipment and their methodologies. Topics include ways to integrate technology into the classroom, lab safety, and the development of inquiry-based classroom activities. *Preq:* BIOL 104/106 or 111.

BIOSC 484, H484, 684 Human and Comparative Vertebrate Embryology 3(3,0) Study of human and comparative embryology with an introduction to related clinical correlations. Students develop an understanding of normal and abnormal human and comparative vertebrate embryonic development. *Preq:* BIOL 111 or consent of instructor.

BIOSC 486 Natural History 3(3,0) Interdisciplinary examination, through readings and critical discussion, of concepts of nature and biodiversity in relation to human endeavors. Course seeks to achieve a balanced perspective from which to seek compromises between conflicting views of nature. *Preq:* BIOSC 441, 443, or 446, or equivalent, or consent of instructor.

BIOSC 487, 687 Electron and Optical Microscopy Theory 3(2,2) Offers a theoretical and practical introduction to light and electron microscopy. Topics include Koehler illumination, polarization, interference, phase contrast, DIC epifluorescence, laser scanning light microscopy, SEM, TEM, EDS, ultramicrotomy, tomography, and digital imaging. *Preq:* Consent of instructor.

BIOSC 489 Clinical Applications and Medical Practice 3(2,2) Explores the various fields, specialties, and subspecialties in medicine. Provides students with the opportunity to shadow physicians in a hospital and/or office setting and to discuss current issues and advances in medicine with practicing physicians and other health care professionals. *Preq:* Junior standing and consent of instructor.

BIOSC 491, H491 Undergraduate Research in Biological Sciences 1-4(0,3-12) Mentored research problems introduce undergraduate students to the planning and execution of research and the presentation of research findings. May be repeated for a maximum of eight credits. Honors students must take at least six credits under a single research advisor over two semesters and must write an honors thesis. *Preq:* Consent of instructor.

BIOSC 492 Internship in Biological Sciences 1-4(0,3-12) Preplanned internship at an advisor-approved facility to give students learning opportunities beyond their classroom experiences. Students submit a Student Internship Contract and a two-page study plan before the internship and a comprehensive report within one week of the end of the internship. May be repeated for a maximum of six credits. To be taken Pass/Fail only. *Preq:* Consent of advisor.

BIOSC 493 Senior Seminar 2(2,0) Capstone course engaging students in analysis and discussion of publications from the technical and non-technical literature in biological sciences and from current topics of biology appearing in other media. Students complete their undergraduate on-line digital portfolios. Emphasis is placed on ethical issues that arise as a result of biological research. *Preq:* Senior standing; COMM 150 or ENGL 314; or consent of instructor.

BIOSC (MICRO) 494, H494 Selected Topics in Creative Inquiry II 2-3(1,3-6) Disciplinary and multidisciplinary group research projects with the goal of developing the students' ability to discover, analyze, and evaluate data. Students are required to document their research activities in their portfolios. May be repeated for a maximum of six credits. Honors students must take at least six credits over a two-semester period with the same research advisor and write an honors thesis. These credits may include BIOSC 394, BIOSC 494 or both. *Preq:* Consent of instructor.

BIOSC 495 Service Learning in Biology 2-4(1-2,3-9) Combines service and academic learning while helping pre-college or college students learn about the fundamental aspects of science. Provides lecture and laboratory experiences as students learn to prepare and participate in supervised laboratory teaching for pre-college or college students. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

BIOSC 496 Selected Topics 1-4(1-4,0) Lecture coverage of selected topics in cellular and developmental biology, ecology, behavior, evolutionary biology, molecular biology, physiology, systematics, and other topics in the biological sciences. May be repeated for a maximum of nine credits, but only if different topics are covered. *Preq:* Junior standing or consent of instructor.

BIOSC 497 Special Topics Laboratory 1-3(0,2-9) Specialized laboratory experiences in cellular and developmental biology, ecology, behavior, evolutionary biology, molecular biology, physiology, systematics, and other topics of interest in the biological sciences. May be repeated for a maximum of nine credits, but only if different topics are covered. *Preq:* Junior standing or consent of instructor.

BIOLOGY

Professors: J. L. Dickey, R. J. Kosinski, M. B. Pracek, W. M. Surver; *Associate Professors:* R. A. Garcia, K. D. Layfield, A. D. Smith, S. A. Sparace; *Assistant Professor:* N. R. Espinoza; *Senior Lecturer:* V. C. Minor; *Lecturers:* K. L. Ickes, T. Kaisa

BIOL 103, H103 General Biology I 3(3,0) First in a two-semester sequence. Includes an evolutionary approach to cells, cellular activities, genetics, and animal diversity emphasizing the processes of science. Credit toward a degree will be given for BIOL 103 or 110 only.

BIOL 104, H104 General Biology II 3(3,0) Continuation of BIOL 103. Includes an evolutionary approach to human anatomy and physiology, plant diversity, morphology, and physiology and principles of ecology. Credit toward a degree will be given for BIOL 104 or 111 only.

BIOL 105 General Biology Laboratory I 1(0,3) Laboratory to accompany BIOL 103. Emphasizes developing laboratory techniques, becoming familiar with biological instrumentation, and performing investigations and interpreting results in the areas of biochemistry, cell biology, and molecular biology. *Coreq:* BIOL 103.

BIOL 106 General Biology Laboratory II 1(0,3) Laboratory to accompany BIOL 104. Emphasizes developing laboratory techniques, becoming familiar with biological instrumentation, and performing investigations and interpreting results in the areas of organismal structure, physiology, and ecology. *Coreq:* BIOL 104.

BIOL 109 Introduction to Life Science 4(3,3) Survey of topics in botany, zoology, microbiology, and ecology emphasizing comprehension and practical application of life-science concepts to experiments and activities for the elementary school classroom. Enrollment priority will be given to Early Childhood and Elementary Education majors.

BIOL 110, H110 Principles of Biology I 5(4,3) Introductory course designed for students majoring in biological disciplines. Integrates lecture and laboratory and emphasizes a modern, quantitative, and experimental approach to explanations of structure, composition, dynamics, interactions, and evolution of cells and organisms. High school chemistry is recommended. Credit toward a degree will be given for BIOL 110 or 103 only. *Coreq:* CH 101.

BIOL 111, H111 Principles of Biology II 5(4,3) Continuation of BIOL 110, emphasizing the study of plants and animals as functional organisms and the principles of ecology. Credit toward a degree will be given for BIOL 111 or 104 only. *Preq:* BIOL 110.

BIOL 120 Biological Inquiry Laboratory 1(0,3) Required laboratory experience to accompany BIOL 121, 122, 123, or 124. Focuses on the process and outcomes of scientific inquiry. Students employ scientific methodology in a laboratory environment as well as critical analysis of biological problems in a small group context. *Coreq:* BIOL 121, 122, 123, or 124.

BIOL 121 Keys to Human Identity 3(3,0) Introduction to scientific inquiry that emphasizes the biological aspects of human identity, including genetics, development, and the brain. Applications in biotechnology and ethical issues associated with these topics are discussed. Credit toward a degree will be given for only one of BIOL 121, 122, 123, 124.

BIOL 122 Keys to Biodiversity 3(3,0) Introduction to scientific inquiry through analysis of biodiversity. Biological foundations for life are studied, including evolution, ecology, genetics, cells, and molecules. Also includes discussion of ethical issues related to biodiversity. Credit toward a degree will be given for only one of BIOL 121, 122, 123, 124.

BIOL 123 Keys to Human Biology 3(3,0) Introduction to scientific inquiry through human biology. Considers biological processes occurring within humans and human impact on global biological processes. Interrelationships ultimately affecting evolution and diversity are explored. Credit toward a degree will be given for only one of BIOL 121, 122, 123, 124.

BIOL 124 Keys to Reproduction: Cells, Organisms, Populations, Ecosystems 3(3,0) Introduction to scientific inquiry through analysis of the process of reproduction. The ethics of human reproduction and the evolution and ecological impact of population growth and extinction are emphasized. Credit toward a degree will be given for only one of BIOL 121, 122, 123, 124.

BIOL 201 Biotechnology and Society 3(3,0) Introduction to the theories, fields, and applications of biotechnology, including the structure and function of genes and their manipulation to improve plant and animal productivity and human health. Individual case studies are examined, including social and ethical issues surrounding biotechnology-based research and development. Not open to Genetics majors. *Preq:* BIOL 120 and 121, 122, 123, or 124; or equivalent; or consent of instructor.

BIOL 203 Human Disease and Society 3(3,0) Focuses on the basic biology underlying human disease, how disease is understood, and current methods of prevention and treatment of disease. The economics as well as the social and ethical issues surrounding human disease are a common thread throughout the course. *Preq:* BIOL 104/106; 111; 121, 122, 123, or 124; or consent of instructor.

BIOL 210 Evolution and Creationism 3(3,0) Critical review of the scientific and technological basis for evolutionary theory compared to creationist explanations for the origin and diversity of life. Includes a historical survey of the impact that the evolution/creation debate has had on law, politics, education, and other important aspects of society. Credit toward a degree will be given for only one of BIOL 210 or PHIL 210. *Preq:* BIOL 104/106; 111; 121, 122, 123, or 124; or consent of instructor.

BIOL 220 Biology: Concepts, Issues, and Values 3(3,0) Develops a thorough knowledge of basic biological concepts and issues and explores how these can be incorporated into a system of human values affecting technology, society, and life.

BIOMOLECULAR ENGINEERING

BMOLE 403, 603 Biotransport Phenomena 3(3,0) Analysis of single and multidimensional steady-state and transient problems in momentum, mass, and energy transfer in biological systems. Mathematical similarities and differences in these mechanisms are stressed, and mathematical descriptions of physiological and engineering systems are formulated. *Preq:* CH E 330, MTHSC 208.

BMOLE 423, 623 Bioseparations 3(3,0) Study of principal methods of separation and purification of bioproducts, such as proteins, amino acids, and pharmaceuticals. Topics include analytical bioseparations, membrane separations, sedimentation, cell disruption, extraction, adsorption, chromatography, precipitation, crystallization, and drying. *Preq:* BIOCH 301, 305, or 423; CH E 330; or consent of instructor.

BMOLE 425, 625 Biomolecular Engineering 3(3,0) Introduction to basic principles of biomolecular engineering: the purposeful manipulation of biological molecules and processes applied to problems and issues in the life sciences, biotechnology, and medicine. Topics include carbohydrates, proteins, nucleic acids, and lipids with emphasis on their structure-property-function relations; molecular recognition; biochemical pathway engineering; and cell growth. *Preq:* CH E 230 and 319 or consent of instructor.

BMOLE 426, 626 Biosensors and Bioelectronic Devices 3(3,0) Development of methodologies used to design, fabricate, and apply biosensors and bioelectronic devices for the environmental, medical, and chemicals industries. Application of the fundamentals of measurement science to optical, electrochemical, mass, and thermal means of signal transduction. Use of the fundamentals of surface science to interpret bio-immobilization and biomolecule-surface interactions. *Preq:* CH E 330, and BIOCH 301 or 305, or consent of instructor.

BMOLE 427 Membranes for Biotechnology and Biomedicine 3(3,0) Students learn principles of membrane science and technology and study membrane applications in the biotechnology and biomedical industries. Advanced topics include surface modification of membranes, synthesis of porous membranes for biomedical applications such as tissue engineering, environmentally responsive membranes, and membrane-based biomedical devices. *Preq:* CH E 330 or equivalent or consent of instructor.

BIOSYSTEMS ENGINEERING

Professors: J. P. Chastain, Y.J. Han, *Interim Chair*; J. C. Hayes, A. Khalilian, T. H. Walker; *Associate Professors:* C. M. Drapcho, H. J. Farahani, T. O. Owino; *Assistant Professors:* A. T. Chow, D. R. Hitchcock, A. Jayakaran, C. V. Privette, C. B. Sawyer; *Lecturer:* K.R. Kirk

BE 199 Creative Inquiry—Biosystems Engineering I 1-3(1-3,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be taken twice for a maximum of six credits. To be taken Pass/Fail only.

B E 210 Introduction to Biosystems Engineering 2(1,3) Overview of topics and engineering application areas that comprise the biosystems engineering profession. Significant emphasis is also given to development of oral and written communication skills needed by the engineering professional, introduction to design methodology, and application of engineering fundamentals to biological systems. *Preq:* ENGR 130, MTHSC 106.

B E 212 Fundamentals of Biosystems Engineering 2(1,3) Introduction to fundamental concepts in biosystems engineering, including mass, energy, and momentum balances; mass, heat, and momentum transfer; biological response to environmental variables, biological materials, biological kinetics, and techniques of measurement and analysis of engineering and biological data. Laboratory includes hand-on exercises, problem solving and computer sessions, and oral presentations. *Preq:* B E 210.

B E 222 Geomeasurements 2(1,3) Fundamentals of land measurement and traverse calculations. Leveling, earthwork, area, and topographic measurements using levels, total stations, and GPS. Application of mapping via GIS. *Preq:* MTHSC 106.

- BE 299 Creative Inquiry—Biosystems Engineering II 1-3(1-3,0)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be taken twice for a maximum of six credits. To be taken Pass/Fail only.
- BE H300 Biosystems Engineering Honors Seminar 0(0,1)** Introduces undergraduate students to current faculty research. Project ideas are then developed to prepare students in choosing a research topic for the senior honors thesis. Students are required to attend senior honors thesis presentations. To be taken Pass/Fail only. *Preq:* Junior standing in departmental honors program.
- BE H301 Biosystems Engineering Honors Thesis Research 3(0,6)** Honors thesis project proposal, initial research, report, and presentation of biosystems engineering project for completion of junior requirements of the Biosystems Engineering Honors program. *Preq:* BE H300
- BE 314 Biosystems Engineering Mechanical Design 3(3,0)** Study of basic mechanical design of biosystems. Includes an introduction to biomechanics and biomaterial properties. Studies applications of machine components and their selection related to specific types of biosystems. Team design project is required. *Preq:* CE 206 or ME 302.
- BE 322 Small Watershed Hydrology and Sedimentology 3(3,0)** Fundamental relationships governing rainfall disposition are used as bases for defining the hydrology of watersheds. Emphasizes application of modeling techniques appropriate for runoff and sediment control. *Preq:* PHYS 122. *Coreq:* CE 321 or CSENV 202.
- BE 370 Practicum 1-3** Preplanned internship with an approved employer involved with biosystems engineering endeavors. A minimum 130 hours of supervised responsibility is required per credit hour. Evaluation is based on activity journal, written/oral report, and an evaluation from the supervisor. May be repeated for a maximum of three credits. To be taken Pass/Fail only. *Preq:* Junior standing and departmental consent.
- BE 399 Creative Inquiry—Biosystems Engineering III 1-3(1-3,0)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be taken twice for a maximum of six credits. To be taken Pass/Fail only.
- BE H400 Biosystems Engineering Honors Thesis 3(0,6)** Individual research projects are conducted under the supervision and guidance of a faculty member. Senior honors thesis is required. *Preq:* BE H300, H301.
- BE (CSENV) 408, 608 Land Treatment of Wastewater and Sludges 3(3,0)** See CSENV 408.
- BE 410, 610 Biological Kinetics and Reactor Modeling 3(2,3)** Fundamentals of microbial and biochemical kinetics used in analysis and design of biological systems. Topics include mathematical and computer modeling of biological kinetics and systems, estimating model coefficients, and development of microbial kinetic models as basis for batch and continuous reactor design. *Preq:* BE 212, MTHSC 208.
- BE 412, 612 Heat and Mass Transport in Biosystems Engineering 3(3,0)** Fundamentals of heat and mass transport used in engineering design and analysis of biological systems; principles of steady state and transient energy and mass balances, including chemical and biological generation terms. *Preq:* BE 312, MTHSC 208. *Coreq:* ME 310.
- BE 414, 614 Biosystems Engineering Unit Operations 3(2,3)** Applies the basic principles of statics, dynamics, and thermodynamics to design of mechanical and electrical systems supporting biological operations and processes. *Preq:* BE 314, ME 310.
- BE 415, 615 Instrumentation and Control for Biosystems Engineers 4(3,3)** Overview of modern instrumentation techniques and digital electronic components and subsystems to integrate them into digital data acquisition and control systems for biosystems. Laboratory use of equipment is emphasized. Topics include characteristics of instruments, signal conditioning, transducer theory and applications, programmable logic controllers, and digital data acquisition and control. *Preq:* ECE 307.
- BE 417, 617 Applied Instrumentation and Control for Biosystems 2(1,3)** Hardware and software implementation of digital data acquisition and control systems for application to agriculture, aquaculture, biotechnology, and other biosystems. Topics include digital electronic circuits and components, microcomputer architecture, interfacing, and programming. *Preq:* BE 415 or consent of instructor.
- BE 421 Engineering Systems for Soil Water Management 2(1,3)** Presents fundamentals of design related to drainage of lands, irrigation, and modification of the microenvironment for optimum productivity. *Preq:* MTHSC 208. *Coreq:* CE 341.
- BE 422, 622 Hydrologic Modeling of Small Watersheds 3(3,0)** Design of structures and development of best management practices for runoff, flood, and sediment control from rural and urban areas, including natural and disturbed watersheds. Topics include modeling of prismatic and non-prismatic channels, culverts, and detention/retention ponds. *Preq:* BE 322 or consent of instructor.
- BE 424 Ecological Engineering 3(3,0)** Focuses on engineering solutions to environmental and socioeconomic problems using ecological design principles. Explores ecosystem processes as they pertain to sustainable development, natural resource protection, food and energy production, waste management, and environmental restoration. Engineering fundamentals and ecological modeling are integral components of this course. *Preq:* Senior standing in Engineering.
- BE (CH E) 428, 628 Biochemical Engineering 3(3,0)** Use of microorganisms and enzymes for the production of chemical feedstocks, single-cell protein, antibiotics, and other fermentation products. Topics include kinetics and energetics of microbial metabolism, design and analysis of reactors for microbial growth and enzyme-catalyzed reactions, and considerations of scale-up, mass transfer, and sterilization during reactor design. *Preq:* BE 312, MICRO 305; *Coreq:* (for Biosystems Engineering majors) BIOCH 301 or 305; (for Chemical Engineering majors) CH E 330, 450.
- BE 431 Structural Design for Biosystems 2(2,0)** Analysis and design of structures and statically determinant components with emphasis on wood. *Preq:* CE 206 or ME 302.
- BE 435, 635 Applications in Biotechnology Engineering 3(2,3)** Bioengineering principles applied to the expanding fields of agricultural biotechnology, ecotechnology, and biomedical technology. Specific applications include waste treatment and ecological engineering, bioreactor propagation of plant and animal cells and tissues, applied genomics and synthetic seed production, biosensors and biomonitoring, biological implants and materials biocompatibility. *Preq:* BE (CH E) 428.
- BE 438, 638 Bioprocess Engineering Design 3(2,2)** Design and analysis of systems for processing biological materials. Topics include biotechnology, thermodynamics, transport processes, and biological properties related to bioprocess design and computational simulation. Unit operations include basic bioreactor operation, bioseparations, and preservation techniques. *Preq:* BE (CH E) 428.
- BE 440, 640 Renewable Energy Resource Engineering 3(2,2)** Investigation into merging renewable energy resources, including detailed study of solar, wind, and bioenergy alternatives. Also includes principles, technologies, and performance evaluation of components for these technologies and an introduction to tidal, hydro, geothermal, and other energy; energy conservation; cogeneration; financial, economical, and other issues related to alternative energy sources. *Preq:* Science or engineering major, consent of instructor.
- BE 442, 642 Properties and Processing of Biological Products 2(1,3)** Study of engineering properties of biological materials and their uniqueness as design restraints on systems for handling, processing, and preserving biological products. *Preq:* BE 412, CE 341, ME 302, 310.
- BE (EE&S, FOR) 451, H451, 651 Newman Seminar and Lecture Series in Natural Resources Engineering 1(0,2)** Topics dealing with development and protection of land, air, water, and related resources are covered by seminar with instructor and invited lecturers. Current environmental and/or resource conservation issues are addressed. *Preq:* Senior standing, consent of instructor.
- BE 464, 664 Non-Point Source Management in Engineered Ecosystems 3(2,3)** Fundamentals of non-point source pollution, including quantification of environmental impact and ecosystem management related to contaminants and nutrients and to planning and design of ecological systems. *Preq:* MICRO 305, Senior standing in engineering, or consent of instructor.
- BE 473 Special Topics in Biosystems Engineering 1-3(1-3,0)** Comprehensive study of special topics not covered in other courses. Emphasizes independent pursuit of detailed investigations. May be repeated for a maximum of six credits, but only if different topics are covered. Senior standing and consent of department.

B E 474 Biosystems Engineering Design/Project Management 2(1,3) Study of biological systems design using hydrology principles, fluid mechanics, bioprocessing, heat/mass transfer, instrumentation, mechanical unit operations, and structural principles for project design, scheduling, and cost estimation. Topics also include engineering ethics, professional development, written and oral communication, and job skills. Senior portfolios are also developed. *Prq:* B E 314, 412, 415; (CH E) 428 (Applied Biotechnology Concentration) or 322 (Natural Resources and Environment Concentration).

B E 475 Biosystems Engineering Capstone Design 2(0,4) Applications of hydrology, fluid mechanics, bioprocessing, heat/mass transfer, instrumentation, mechanical unit operations, and structural principles in design; project scheduling; cost estimation; ethics; environmental and social impacts; design drawings; and report documentation. *Prq:* B E 474; CH E 230.

B E (EE&S) 484, 684 Municipal Solid Waste Management 3(3,0) See EE&S 484.

B E 499 Creative Inquiry—Biosystems Engineering IV 1-3(1-3,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be taken twice for a maximum of six credits. To be taken Pass/Fail only.

BIOSYSTEMS TECHNOLOGY

Professor: T. R. Dobbins; *Associate Professors:* C. M. Drapcho, T. H. Walker

B T 220 Biosystems Technology I 3(2,3) Introduces fundamental and applied concepts used in bioprocessing for biofuels and other high value compounds. Topics include operation of batch and continuous flow bioreactors, microbial growth in anaerobic and aerobic environments, fermentation for biofuel production, and use of renewable energy in bioprocessing. Laboratory includes hands-on exercises, problem-solving/computer sessions and oral presentations. *Prq:* BIOL 103/105 and CH 101.

B T 240 Biosystems Technology II 3(2,3) Introduces basic unit operations used in bioprocessing for biofuels and other bioproducts. Covers operation and selection of pumps, heat exchangers, separation systems and sensors used in bioprocessing. Laboratory includes hands-on exercises, problem-solving/computer sessions, and oral presentations. *Prq:* B T 220.

BUSINESS

Professor: M. A. McKnew; *Lecturers:* E. B. De Iulio, S. Edge, D. L. Lefort, L. S. Young

BUS 101 Business Foundations 1(1,0) Introduction to a variety of topics critical to student success, including an overview of Clemson business degrees, on-campus resources available to ensure success, academic advising, business ethics, internships, co-ops, study abroad programs, student organizations, ePortfolios, and Clemson history.

BUS H291 Honors Seminar in International Business 1(1,0) Introduction to the International Business Honors Program presented through a discussion of thesis expectations, study abroad experiences, and seminars given by returning senior International Business Honors students. To be taken Pass/Fail only. *Prq:* Membership in Calhoun Honors College.

BUS 299 Creative Inquiry—Business 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of four credits.

BUS H391 International Business Honors Thesis Research 1(1,0) Students work with a Clemson advisor and an international advisor to develop a research topic for the senior thesis. Students work and conduct research while participating in an approved study abroad. To be taken Pass/Fail only. *Prq:* BUS H291.

BUS H392 International Business Honors Thesis Proposal 1(1,0) Students work with a Clemson advisor and an international advisor to complete a proposal for the senior thesis. Students work and conduct research while participating in an approved study abroad. To be taken Pass/Fail only. *Prq:* BUS H391.

BUS 399 Creative Inquiry—Business 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of four credits.

BUS H491 International Business Honors Thesis I 3(3,0) Students work with an advisor to conduct literature review and research on a senior thesis topic and prepare presentations and thesis drafts based on this work. *Prq:* BUS H392.

BUS H492 International Business Honors Thesis II 3(3,0) Students work with an advisor to complete a senior thesis. They prepare and present a seminar on the topic for presentation to faculty and other International Business Honors students. *Prq:* BUS H491.

BUS 499 Creative Inquiry—Business 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of four credits.

CAREER AND TECHNOLOGY EDUCATION

Professors: W. L. Havice, W. D. Paige; *Associate Professor:* C. E. Poston; *Lecturer:* H. L. Harrison

CTE 110 Introduction to Career and Technology Education 3(2,3) Examines the philosophy of technology education in the public school system and the philosophy and organization of training and development. Students are given an orientation to the major in Career and Technology Education and an overview of the principles of technology.

CTE 115 Contemporary Technological Problems 3(3,0) Provides students with an understanding of the problems and contributions of technology. Examples are taken from historical accounts and from analyses of contemporary technological intervention both in industrialized and nonindustrialized countries.

CTE 160 Training Programs in Industry 3(3,0) Introduction and first-hand experience in industrial training programs. Emphasis is on observing and participating in actual training situations as well as communications and media usage in industry. *Prq:* CTE 110.

CTE 180 Introduction to Technical Drawing and Computer-Aided Drafting 3(1,6) Introductory drafting course utilizing traditional drafting techniques and computer software to explore technical drawing and orthographic projection through construction of multiview and isometric projections, sectional and auxiliary views, dimensioned working drawings, developments, and intersections. Freehand sketching is a means of problem solving and analysis.

CTE 181 Technical Design 3(1,6) Provides students with the basic procedures involved in the design of a new technology product, including needs identification; functional analysis; functional allocation; resource identification; optimization; and schedule, cost, and performance management. *Prq:* CTE 110, 180 or equivalent; or consent of instructor.

CTE 220 Manufacturing Technology I: Systems 3(2,3) Introduction to management, personnel, and production systems studies through the creation of a corporation. Includes product identification, product research and design, selection of processes, plant design, production systems, and system enhancement. *Prq:* CTE 110 and 180 or consent of instructor.

CTE 221 Exploring Technology 3(3,0) Covers a wide range of technological concepts along with familiar examples of how technology impacts our lives as individuals, a society, and a global community.

CTE 230 Construction Technology I: Materials 3(2,3) Introduction to the commonly used building materials and methods of combining them in present day construction. *Prq:* CTE 110 or consent of instructor.

CTE 240 Power Technology I: Production 3(2,3) Study of power in terms of energy sources and the generation of power. Emphasizes the development of insights and understandings of the scientific and operational principles involved in the production and utilization of power. *Prq:* CTE 110 or consent of instructor.

CTE 250 Electricity 3(2,3) Theory and application of DC and AC fundamentals, including instrumentation, power sources, circuit analysis, motors, construction wiring, and electronic principles and components.

CTE 280 Communications Technology I: Processes and Materials 3(2,3) Topics include graphic communications, photography, computer application and use as a visual communication medium, and audio/video production and application.

CTE 310 Designing Creative Instruction 3(2,2) Provides preservice teachers with opportunities to develop skills in technological literacy, design, inquiry-based instruction, and problem solving using a variety of media, with emphasis on their applications in the elementary curriculum. *Prq:* Junior standing in Early Childhood or Elementary Education or consent of instructor.

CTE (ED F) 315 Technology Skills for Learning 1(0,2) See ED F 315.

CTE 360 Safety 3(3,0) Study of the relationship of training and safety personnel to the kinds of tasks they are asked to perform. Emphasizes safety knowledge development and techniques which may be used in safety training.

CTE 370 Motivation and Discipline in Career and Technology Education 3(3,0) Provides classroom teachers and prospective teachers with knowledge and skills in techniques of student discipline and motivation with application to the technology education settings.

CTE 371 Management of Career and Technology Education Laboratories 3(2,2) Management and operation of unit and multiple-activity laboratories, including laboratory design, selection and procurement of tools and equipment, budgeting management, and coordination of activities in laboratory courses.

CTE 390 Cooperative Experience I 6(0,18) Full-time work experience in industry. Students are requested to register with the instructor one semester prior to the summer in which they plan to enroll. Offered summer session only.

CTE 410, 610 Selected Topics I-3(1-3,0) Subject areas organized according to program needs. Content is planned cooperatively by the University and the school system or agency requesting the course. May be repeated for a maximum of 18 credits, but only if different topics are covered. *Prq:* Consent of instructor.

CTE 415, 615 History and Philosophy of Career and Technology Education 3(3,0) Study of career and technology education programs with the intent of developing a sound individual philosophy. General topics covered are history, local, state, and federal legislation; types of career and technology programs; professional organizations and career guidance.

CTE 420, 620 Manufacturing II: Computer-Integrated Manufacturing 3(2,3) Study of computer-integrated manufacturing and its related concepts, including robotics, computer numeric control, electronic pneumatic and sensor systems, programmable logic controllers, and ancillary devices. *Prq:* CTE 220 or consent of instructor.

CTE 430, 630 Construction Technology II: Practices and Systems 3(2,3) Study of industrial practices and systems affecting man, materials, and equipment associated with construction industries. Activities are directed toward developing a working knowledge of construction technology and a framework for incorporating this instruction into programs in the public and private sectors. *Prq:* CTE 230.

CTE 440, 640 Power Technology II: Transmission and Control Systems 3(2,3) Continuation of CTE 240. Instruction in transmitting and controlling power for utilization in such areas as manufacturing, communications, construction, and transportation. Introduces concepts of automation and robotics to enable the classroom teachers and industry personnel to gain necessary insights into this important area of technology. *Prq:* CTE 240.

CTE 450 Electronics for Educators 3(1,6) Principles of electronics as applied in communications and automatic controls involving transistors, integrated circuits, and other electronic devices and materials for the preparation of teachers of industrial arts and vocational-technical electricity and electronics. *Prq:* CTE 250 or equivalent.

CTE 460, 660 Developing Training Programs for Industry 3(3,0) Identification, selection, and organization of subject matter for industrial training programs. Emphasizes analysis techniques, session and demonstration planning, written instructional materials development, trainee evaluation, and planning instructional schedules. *Prq:* Senior standing in Career and Technology Education or consent of instructor.

CTE 461 Workplace Safety 3(3,0) Consideration of safety-related problems in the workplace. Emphasizes OSHA regulations and procedures. *Prq:* CTE 360.

CTE 465, 665 Conducting and Evaluating Training Programs 3(3,0) Basic concepts of supervision, administration, and management of training programs. Emphasis is on determining training requirements, planning, directing, and evaluating training programs. *Prq:* CTE 160, 460 or consent of instructor.

CTE 468, H468, 668 Public Relations 3(3,0) Emphasizes techniques and methods of effective public and industrial relations which contribute to understanding and cooperation of labor, business, professional, educational, and industrial groups.

CTE 470, 670 Course Organization and Evaluation 3(3,0) Problems, techniques, and procedures in the preparation, selection, and organization of subject matter for instructional purposes. Methods, techniques, and preparation of materials used in the evaluation of student achievement in industrial education subjects.

CTE 471, 671 Teaching Career and Technology Education 3(3,0) Effective methods for teaching and training in career and technology education. Emphasis is given to class organization, preparation of lesson outlines, and audio-visual aids.

CTE 472 Advanced Instructional Methods 3(3,0) Familiarizes students with the various equipment, materials, and techniques associated with the delivery of instruction. Students design, produce, and present materials to meet specific educational objectives. *Prq:* CTE 471 or one year of teaching experience.

CTE 473, 673 Assessment in Career and Technology Education 3(3,0) Study of competency testing in career and technology education which includes educational objectives and measurement; construction and use of oral, objective, short answer, matching, essay, and performance tests; and treatment of test data for grade assignments and statistical analysis.

CTE 477 Directed Teaching 12(0,36) Supervised observation and teaching in cooperation with selected public schools in which opportunities are provided for securing experience in teaching industrial subjects. *Prq:* CTE 371, 471, 2.0 cumulative grade-point ratio.

CTE 478 Internship in Career and Technology Education I 6(0,18) Supervised observation and teaching in cooperation with selected area career centers, high schools, and technical colleges to provide experience in teaching specified subjects. *Prq:* CTE 371, consent of instructor.

CTE 479 Internship in Career and Technology Education II 6(0,18) Continuation of CTE 478. *Prq:* CTE 478, consent of instructor.

CTE (AG ED, ED F) 480, 680 Digital Technology in the 21st Century Classroom 3(2,2) See ED F 480.

CTE (AG ED, ED F) 482, 682 Advanced Educational Applications of Microcomputers 3(2,2) See ED F 482.

CTE 483, 683 Architectural Drafting for Career and Technology Education 3(1,6) Study of the major aspects of architectural drawing, such as plot, floor, and foundation plans; wall sections; and elevations. *Prq:* CTE 180.

CTE 484, 684 Communications Technology II: Systems 3(2,2) Continuation of CTE 280. Includes theory and operation of communications systems: telegraph, telephone, radio, television, satellites, sound/video recorders, lasers, and computers. Instruction on strategies for interpreting this area of technology to trainees and students is emphasized. *Prq:* CTE 280.

CTE 486, 686 Instructional Media Development 3(1,4) Basic instructional media development techniques are presented. Students develop material using authoring software such as HyperCard, transparencies using Persuasion and/or PowerPoint, and fully storyboarded, scripted, and edited digital as well as analog video.

CTE 490 Cooperative Experience II 6(0,18) Continuation of CTE 390.

CTE 491 Special Projects 3(3,0) Students are assigned projects in accordance with their needs and capabilities. Projects are either experimental, theoretical, or developmental and cover subjects not thoroughly covered in other courses. Written project approval is required before registering. *Prq:* Consent of instructor.

CTE 492, 692 Advanced Projects I-6 Students gain depth in content by completing projects under the supervision of an instructor in career and technology education. Written approval is required before registering. May be repeated twice for a maximum of six credits. *Prq:* Consent of instructor.

CERAMIC AND MATERIALS ENGINEERING

Professors: J. M. Ballato, D. A. Brosnan, M. S. Ellison, S. H. Foulger, G. C. Lickfield, I. A. Luzinov, H. J. Rack, K. A. Richardson, *Director*; *Associate Professors:* P. J. Brown, K. Kornev, J. Luo; *Assistant Professors:* V. Blouin, M. Kennedy, T. Metford

C M E 210 Introduction to Materials Science 3(3,0) Introductory course in materials science designed primarily for engineering students. Studies the relation between the electrical, mechanical, and thermal properties of products and the structure and composition of these products. All levels of structure are considered from gross structures easily visible to the eye through electronic structure of atoms. *Preq:* CH 101, MTHSC 108, or consent of instructor.

C M E 241 Metrics Laboratory 1(0,3) Provides basic knowledge of statistical techniques and testing procedures used to evaluate materials. Includes sampling procedures, calculation of averages, confidence intervals, Weibull statistics, precision and accuracy to enable quality decision making. *Coreq:* C M E 210.

C M E H300 Honors Seminar 1(1,0) Acquaints students enrolled in the Departmental Honors Program with current research issues in the profession. This assists students in preparing a research proposal for the Senior Thesis. To be taken Pass/Fail only. *Preq:* Junior standing, admission to departmental honors program.

C M E 319 Materials Processing I 3(3,0) Introduction into the principles underlying the processing/manufacturing of ceramic, polymeric, and metallic materials. *Coreq:* C M E 210 or consent of instructor.

C M E 326 Thermodynamics of Materials 3(3,0) Introduction to physical laws that govern the equilibrium products of chemical and thermal reactions. Covers the three laws of thermodynamics, phase equilibria, energy requirements for reactions, material corrosion, and environmental stability. *Preq:* C M E 210, CH 102, MTHSC 108, PHYS 221.

C M E 327 Transport Phenomena 3(3,0) Kinetic aspects of mass, heat, and fluid transport as they relate to the processing and performance of materials. *Coreq:* C M E 326, MTHSC 208.

C M E 328 Phase Diagrams for Materials Processing and Applications 3(3,0) Teaches students to use single component, binary, and ternary phase diagrams to analyze material processing routes and utilization. Considers reaction pathways by which material microstructure evolves and the relationship of reaction pathway to equilibrium phase diagrams. Also considers material interactions/degradation during use. *Preq:* C M E 326.

C M E 342 Structure/Property Laboratory 2(0,6) Provides a basic understanding of how microstructure interrelationships and processes affect the physical properties of materials and how environmental effects modify structure and mechanical behavior of materials. *Preq:* C M E 241.

C M E 361 Processing of Metals and Their Composites 3(3,0) Examines the control of microstructure-property relationships in metallic materials and their composites through development and selection of innovative manufacturing methods. *Coreq:* C M E 327.

C M E H395 Honors Research I 3(0,9) Individual research under the direction of a Ceramic and Materials Engineering faculty member. *Coreq:* C M E 327, 328.

C M E 402, 602 Solid State Materials 3(3,0) Discussion of the properties of solids as related to structure and bonding with emphasis on electronic materials. Band structure theory, electronic, and optical properties are treated. *Preq:* C M E 326, MTHSC 208, PHYS 221.

C M E 407 Senior Capstone Design 3(1,6) Work with industrial partners who have materials-related processes or product problems. Emphasizes interdisciplinary team approach and global perspective of products and problems. Incorporates critical thinking, group effectiveness, and problem solving with materials and processes. Collaborative efforts between industry and student academic teams are employed. *Preq:* C M E 441, 1 E 384.

C M E 413 Noncrystalline Materials 3(3,0) Study of the fundamentals of the noncrystalline state. Includes cooling kinetics and effects on formation as well as physical properties of noncrystalline substances in metallic, polymeric, and ceramic systems. *Preq:* C M E 326; *Coreq:* C M E 402.

C M E (BIO E) 415, H415, 615 Research Principles and Concepts 1(1,0) See BIO E 415.

C M E 416, 616 Electrical Properties of Materials 3(3,0) Covers a range of topics dealing with electrical and magnetic materials, including metal and polymer conductors, insulators, ceramic and polymer materials for dielectric applications, and ferroelectric, piezoelectric, pyroelectric, and electrooptic materials. Metal and ceramic magnetic materials are also discussed.

C M E 422, 622 Mechanical Behavior of Materials 3(3,0) Covers the microstructural basis of deformation and fracture in ceramic, metallic, and polymeric systems. *Preq:* E M 201, MTHSC 208 or consent of instructor.

C M E 424, 624 Optical Materials and Their Applications 3(3,0) Introduces the interaction of materials with light. Specific topics include fundamental optical properties, materials synthesis, optical fiber and planar waveguides, and the componentry and systems-level aspects of optical communication systems. *Preq:* C M E 402, 413.

C M E 432 Manufacturing Processes and Systems 3(3,0) Plant layout and design for manufacturing of ceramic products. Emphasizes process control and verification of processing results. Includes adaptation of computers in process simulation/robotics and the use of programmable logic controllers and robotics in processing. *Preq:* C M E 326.

C M E 433 Combustion Systems and Environmental Emissions 3(3,0) Study of the application of burners, burner controls, firing atmospheres, hydrocarbon fuels, and other energy resources to industrial kilns, furnaces, and firing operations. Topics include energy resources, fuel chemistry, combustion analysis, ratio control systems, flow and pressure measurement and control, kiln atmosphere controls, industrial burners, and flames. *Preq:* C M E 326.

C M E 441 Manufacturing Laboratory 1(0,3) Provides students with the understanding of process optimization. Emphasizes the use of complex experimental design schemes to elucidate the interrelationships between processing, microstructural development, and resulting properties. *Preq:* C M E 342.

C M E 445 Practice of Materials Engineering 1(1,0) Students working in groups present and discuss practical, ethical, safety, business, and selected technical topics. Invited speakers discuss various aspects of the engineering world. To be taken Pass/Fail only. *Preq:* C M E 432.

C M E 490, H490, 690 Special Topics in Ceramic Engineering 1-3(1-3,0) Study of topics not ordinarily covered in other courses. Taught as the need arises. Typical topics could include current research in a specific area or technological advances. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of instructor.

C M E H495 Honors Research II 3(0,9) Individual research under the direction of a Ceramic and Materials Engineering faculty member. *Preq:* C M E H395.

C M E H497 Honors Thesis 1(1,0) Preparation of honors thesis based on research conducted in C M E H395 and H495. *Preq:* C M E H495.

CHEMICAL ENGINEERING

Professors: C. H. Gooding, J. G. Goodwin Jr., Chair, A. Guiseppi-Elie, D. E. Hirt, A. A. Ogale, M. C. Thies; *Associate Professors:* D. A. Bruce, G. M. Harrison, S. M. Husson; *Assistant Professor:* C. L. Kitchens

CH E 130 Chemical Engineering Tools 3(2,2) Tools and methods for analyzing engineering problems with applications in chemical and biochemical processes, including development of process flow diagrams, numerical methods, graphing, and applied statistics. Problem-solving and computer skills are developed in the lecture and laboratory activities. *Preq:* CES 102. *Coreq:* MTHSC 108, PHYS 122.

CH E 199 Creative Inquiry—Chemical and Biomolecular Engineering 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

CH E 211 Introduction to Chemical Engineering 4(3,2) Introduction to fundamental concepts of chemical engineering, including mass and energy balances, PVT relationships for gases and vapors, and elementary phase equilibria; problem-solving and computer skills are developed in lab. *Preq:* CH 102, MTHSC 108, PHYS 122; and CH E 130 or ENGR 130.

CH E 220 Chemical Engineering Thermodynamics I 3(3,0) Topics include first and second laws of thermodynamics, ideal gases, PVT properties of real fluids, energy balances with chemical reactions, and thermodynamic properties of real fluids. *Preq:* CH E 211, MTHSC 206.

CH E 230 Fluids/Heat Transfer 4(3,2) General principles of chemical engineering and study of fluid flow, fluid transportation, and heat transmission. Special emphasis is placed on theory and its practical application to design. *Preq:* CH E 211. *Coreq:* CH E 220, MTHSC 206.

CH E 299 Creative Inquiry—Chemical and Biomolecular Engineering 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

- CH E H300 Honors Seminar 1(1,0)** Acquaints students enrolled in the Departmental Honors Program with current research issues in the profession. This assists the student in preparing a research proposal for the Senior Thesis. To be taken Pass/Fail only. *Preq:* Admission to departmental honors program, Junior standing.
- CH E 307 Unit Operations Laboratory I 3(2,3)** Laboratory work in the unit operations of fluid flow, heat transfer, and evaporation. Stress is on the relation between theory and experimental results and the statistical interpretation of those results and on report preparation and presentation. *Preq:* CH E 220, 230.
- CH E 311 Fluid Flow 3(3,0)** Fundamentals of fluid flow and the application of theory to chemical engineering unit operations, such as pumps, compressors, and fluidization. *Preq:* CH E 211, MTHSC 206.
- CH E 312 Heat and Mass Transfer 3(3,0)** Study of the basics of heat transmission and mass transport. Special emphasis is placed on theory and its application to design. *Preq:* CH E 220, 311.
- CH E 319 Engineering Materials 3(3,0)** Introduction to the fundamental properties and behavior of engineering materials emphasizing polymers, metals, ceramics, and composite materials. *Preq:* CH E 211. *Coreq:* CH 223, CH E 220.
- CH E 321 Chemical Engineering Thermodynamics II 3(3,0)** Continuation of CH E 220. Topics include thermodynamics of power cycles and refrigeration/liquefaction, thermodynamic properties of homogeneous mixtures, phase equilibria, and chemical reaction equilibria. *Preq:* CH E 220, MTHSC 208.
- CH E 330 Mass Transfer and Separation Processes 4(3,2)** Study of mass transport fundamentals and application of these fundamentals to separation technologies, with emphasis on gas absorption, stripping, distillation, and liquid-liquid extraction. *Preq:* CH E 230. *Coreq:* CH E 321.
- CH E 344 Chemical Engineering Junior Seminar 1(1,0)** Preparation of junior chemical engineering students for entry into the profession. Timely information on job interviewing skills, career placement and guidance, professional registration, professional behavior and ethics, graduate school, and management of personal finances. Outside speakers are used frequently. To be taken Pass/Fail only. *Preq:* CH E 230.
- CH E 353 Process Dynamics and Control 3(3,0)** Mathematical analysis of the dynamic response of process systems. Basic automatic control theory and design of control systems for process applications. *Preq:* MTHSC 208, CH E 311 or 230. *Coreq:* CH E 330 or 413.
- CH E H395 Honors Research I 3(0,9)** Individual research under the direction of a Chemical Engineering faculty member. *Preq:* CH E H300 or consent of department honors coordinator.
- CH E 399 Creative Inquiry—Chemical and Biomolecular Engineering 1-4(1-4,0)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.
- CH E 401, 601 Transport Phenomena 3(3,0)** Mathematical analysis of single and multidimensional steady-state and transient problems in momentum, energy, and mass transfer. Both the similarities and differences in these mechanisms are stressed. *Preq:* CH E 330, MTHSC 208.
- CH E 407 Unit Operations Laboratory II 3(1,6)** Continuation of CH E 307 with experiments primarily on the diffusional operations. Additional lecture material on report writing and general techniques for experimental measurements and analysis of data, including statistical design of experiments. *Preq:* CH E 307, 330.
- CH E 412, 612 Polymer Engineering 3(3,0)** Design-oriented course in synthetic polymers. Topics include reactor design used in polymer production, effect of step versus addition kinetics on reactor design, epoxy curing reactions, polymer solubility, influence of polymerization and processing conditions on polymer crystallinity. *Preq:* CH 224 and 332 or consent of instructor.
- CH E 413 Separation Processes 3(3,0)** Study of gas-liquid and liquid-liquid separation techniques emphasizing gas absorption, distillation, and liquid-liquid extraction. *Preq:* CH 332, CH E 312, 321.
- CH E (B E) 428, 628 Biochemical Engineering 3(3,0)** See B E 428.
- CH E 431 Chemical Process Design I 3(3,0)** Steps in creating a chemical process design from original concept to successful completion and operation. Topics include process layout, equipment selection and sizing, safety and environmental evaluation, engineering economics, simulation, evaluation of alternatives, and optimization. *Preq:* CH E 307, 321, 330. *Coreq:* CH E 450.
- CH E 432 Process Development, Design, and Optimization of Chemical Engineering Systems II 5(1,12)** Continuation of CH E 431. Principles of process development, design, and optimization are applied in a comprehensive problem carried from a general statement of the problem to detailed design and economic evaluations. *Preq:* CH E 321, 353, 407, 413, and 450 or consent of department chair.
- CH E 433 Process Design II 3(1,6)** Continuation of CH E 431. Principles of process development, design, and optimization are applied in a comprehensive problem carried from a general statement of the problem to detailed design and economic evaluations. *Preq:* CH E 330, 407, 431, 450.
- CH E 443 Chemical Engineering Senior Seminar I 1(1,0)** Preparation of senior chemical engineering students for entry into the profession. Timely information on job interviewing skills, career placement and guidance, professional registration, professional behavior and ethics, and management of personal finances. Outside speakers are used frequently. To be taken Pass/Fail only. *Preq:* CH E 330, Senior standing in Chemical Engineering. *Coreq:* CH E 431.
- CH E 444 Chemical Engineering Senior Seminar II 1(1,0)** Working in groups, students present and discuss topics related to professional practice, ethics, business, industrial safety, the environment, and selected technical subjects of interest to society. To be taken Pass/Fail only. *Preq:* CH E 344 or 443. *Coreq:* CH E 432.
- CH E 445 Selected Topics in Chemical Engineering 3(3,0)** Topics not covered in other courses, emphasizing current literature, research, and practice of chemical engineering. Topics vary from year to year. May be repeated, but only if different topics are covered. *Preq:* Consent of instructor.
- CH E 450, 650 Chemical Reaction Engineering 3(3,0)** Review of kinetics of chemical reactions and an introduction to the analysis and design of chemical reactors. Topics include homogeneous and heterogeneous reactions, batch and continuous flow reaction systems, catalysis, and design of industrial reactors. *Preq:* CH E 321, 330, CH 332.
- CH E 491, H491 Special Projects in Chemical Engineering 1-3(1-3,0)** Topics requested by students or offered by faculty as the need arises. Topics may include review of current research in an area, technological advances, and national engineering goals. May be repeated for a maximum of six credits, but only if different topics are covered.
- CH E H495 Honors Research II 3(0,9)** Individual research under the direction of a chemical engineering faculty member. *Preq:* CH E H395.
- CH E H497 Honors Thesis 1(1,0)** Preparation of honors thesis based on research conducted in CH E H395 and H495. *Preq:* CH E H495.
- CH E 499 Creative Inquiry—Chemical and Biomolecular Engineering 1-4(1-4,0)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

CHEMISTRY

Professors: G. D. Chumanov, M. M. Cooper, S. E. Creager, D. D. DesMarreau, R. K. Dieter, L. A. Echegoyen, S.-J. Hwu, A. L. Kholodenko, J. W. Kolis, R. K. Marcus, W. T. Pennington Jr., D. W. Smith Jr., S. J. Stuart, Y.-P. Sun; *Associate Professors:* J. R. Appling, D. P. Arya, J. Brumaghim, J. D. McNeill, D. Perahia; *Assistant Professors:* J. N. Anker, G. Bhattacharyya, K. A. Christensen, B. N. Dominy, R. C. Smith; *Lecturers:* L. E. Echegoyen, S. R. Ellenberger, N. P. Grove, S. Hepburn, A. Kitaygorodsky, S. O'Connor, K. A. Pressprich, S. J. Schvaneveldt, D. F. D. Taylor, D. G. VanDerveer; *Visiting Assistant Professors:* M. L. Doerr, K. Rillings; *Visiting Instructor:* B. S. Lewis

CH 101, H101 General Chemistry 4(3,3) Introduction to the elementary concepts of chemistry through classroom and laboratory experience. Emphasizes chemical reactions and the use of symbolic representation, the mole concept and its applications and molecular structure. Credit toward a degree will be given for only one of CH 101 and 105. *Preq or Coreq:* CMPT score of 3 or higher; or MTHSC 101, 102, 103, or 105.

CH 102, H102 General Chemistry 4(3,3) Continuation of CH 101, treating solutions, rates of reactions, chemical equilibrium, electrochemistry, chemistry of selected elements, and an introduction to organic chemistry. Credit toward a degree will be given for only one of CH 102 or 106. *Preq:* CH 101 with a C or better.

- CH 105 Chemistry in Context I 4(3,3)** The chemistry of societal issues, including air quality, global warming, acid rain, and alternative energy sources is discussed in the context of their impact on society. May not be taken as a prerequisite for organic chemistry. Credit toward a degree will be given for only one of CH 101 or 105.
- CH 106 Chemistry in Context II 4(3,3)** Continuation of CH 105. Topics include the chemistry of nuclear energy, new energy sources, nutrition, medicines, new materials, and genetic engineering. May not be taken as a prerequisite for organic chemistry. Credit toward a degree will be given for only one of CH 102 or 106. *Preq:* CH 101 or 105.
- CH 141 Chemistry Orientation 1(1,0)** Lectures, discussions, and demonstrations devoted to health and safety in chemistry laboratories; use of the chemical literature; and career planning. *Preq:* Concurrent enrollment in CH 101.
- CH 152 Chemistry Communication I 2(2,0)** Methods for scientific communication, including oral, written, and electronic formats. Service-learning projects engage participants with community needs pertaining to chemistry issues.
- CH 199 Creative Inquiry—Chemistry I 1-4(1-4,0)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.
- CH 201 Survey of Organic Chemistry 4(3,3)** Introduction to organic chemistry emphasizing nomenclature, classes of organic compounds, and chemistry of functional groups. For students needing a one-semester course in organic chemistry. Credit toward a degree will be given for only one of CH 201 or 223. *Preq:* CH 102 or consent of instructor.
- CH 205 Introduction to Inorganic Chemistry 3(3,0)** One semester treatment which emphasizes the properties and reactions of the more common chemical elements. *Preq:* CH 102.
- CH 206 Inorganic Chemistry Laboratory 1(0,3)** Introduction to laboratory synthesis and characterization of inorganic compounds. Laboratory sessions consist of a set of six landmark inorganic experiments for which the original authors have been awarded Nobel prizes. *Coreq:* CH 102, 205.
- CH 223 Organic Chemistry 3(3,0)** Introductory course in the principles of organic chemistry and the derivation of these principles from a study of the properties, preparations, and interrelationships of the important classes of organic compounds. Credit toward a degree will be given for only one of CH 201 or 223. *Preq:* CH 102 or consent of instructor.
- CH 224 Organic Chemistry 3(3,0)** Continuation of CH 223. *Preq:* CH 223.
- CH 227 Organic Chemistry Laboratory 1(0,3)** Synthesis and properties of typical examples of the classes of organic compounds. Credit toward a degree will be given for only one of CH 227 or 229. *Preq:* CH 223 or concurrent enrollment.
- CH 228 Organic Chemistry Laboratory 1(0,3)** Continuation of CH 227. *Preq:* CH 224 (or concurrent enrollment) and 227.
- CH 229 Organic Chemistry Laboratory 1(0,3)** One-semester laboratory for Chemical Engineering students. Credit toward a degree will be given for only one of CH 227 or 229. *Preq:* CH 223.
- CH 299 Creative Inquiry—Chemistry II 1-4(1-4,0)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.
- CH 313 Quantitative Analysis 3(3,0)** Fundamental principles of volumetric, gravimetric, and certain elementary instrumental chemical analyses. *Preq:* Concurrent enrollment for credit in CH 315 or 317.
- CH 315 Quantitative Analysis Laboratory 2(0,6)** Laboratory techniques of volumetric, gravimetric, and elementary instrumental chemical analyses. Credit toward a degree will be given for only one of CH 315 or 317. *Coreq:* Concurrent enrollment for credit in CH 313.
- CH 317 Quantitative Analysis Laboratory 1(0,3)** Standard techniques of analytical chemistry—gravimetric, volumetric, and instrumental. Credit toward a degree will be given for only one of CH 315 or 317. *Coreq:* Concurrent enrollment for credit in CH 313.
- CH 330 Introduction to Physical Chemistry 3(3,0)** One-semester treatment of physical chemistry emphasizing topics that are especially useful in the life sciences, agriculture, and medicine: chemical thermodynamics, equilibrium, solutions, kinetics, electrochemistry, macromolecules, and surface phenomena. Credit toward a degree will be given for only one of CH 330 or 331. *Preq:* MTHSC 106.
- CH 331 Physical Chemistry 3(3,0)** Includes the gaseous state, thermodynamics, chemical equilibria, and atomic and molecular structure, from both experimental and theoretical points of view. Credit toward a degree will be given for only one of CH 330 or 331. *Preq:* MTHSC 206, PHYS 221.
- CH 332, H332 Physical Chemistry 3(3,0)** Continuation of CH 331, including chemical kinetics, liquid and solid state, phase equilibria, solutions, electrochemistry and surfaces. *Preq:* CH 331 or consent of instructor.
- CH 339 Physical Chemistry Laboratory 1(0,3)** Experiments are selected to be of maximum value to Chemistry and Chemical Engineering majors. *Coreq:* CH 331 or CH E 220.
- CH 340 Physical Chemistry Laboratory 1(0,3)** Continuation of CH 339. *Preq:* Concurrent enrollment in CH 332.
- CH 399 Creative Inquiry—Chemistry III 1-4(1-4,0)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.
- CH 400 Selected Topics in Chemistry 1-3(1-3,0)** Comprehensive study of topics of current interest in chemistry. May be repeated for a maximum of twelve credits, but only if different topics are covered.
- CH 402, H402, 602 Inorganic Chemistry 3(3,0)** Basic principles of inorganic chemistry are discussed with special emphasis on atomic structure, chemical bonding, solid state, coordination chemistry, organometallic chemistry, and acid-base theories. The chemistry of certain selected elements is treated. *Preq:* CH 331, 332.
- CH 403 Advanced Synthetic Techniques 2(0,6)** Introduction to advanced laboratory techniques in synthesis and characterization of inorganic and organic compounds. Laboratory sessions consist of a set of eight experiments in modern fields of chemistry, including superconductivity, buckminsterfullerene, bioinorganic chemistry, medicinal chemistry, asymmetric synthesis, and polymer chemistry. *Preq:* CH 227, 228, 402, or consent of instructor.
- CH 404, H404, 604 Bioinorganic Chemistry 3(3,0)** Covers fundamentals of bioinorganic chemistry with review of necessary inorganic and biochemical concepts. Topics include metal uptake, transport, and storage in biological systems; functions of metals in proteins; metal ion interactions with nucleic acids; physical methods used in bioinorganic chemistry; heavy element toxicity, radiopharmaceuticals and other metallodrugs. *Preq:* BIOCH 301 or CH 205.
- CH 411, 611 Instrumental Analysis 3(3,0)** Principles of operation and application of modern chemical instrumentation in the field of analytical chemistry. Topics include basic electronics, statistics, optical, mass, magnetic resonance, electron and x-ray spectroscopies, radiochemistry, and separation science. *Preq:* CH 331, 332.
- CH 412 Instrumental Analysis Laboratory 2(0,5)** Reinforces principles of chemical instrumentation described in CH 411 by practical, hands-on experience. Aspects of sample preparation, standardization, data acquisition and interpretation, and report formulation procedures common in chemical analyses are considered for a range of modern instrumental methods. *Coreq:* CH 411.
- CH 413, H413 Chemistry of Aqueous Systems 3(3,0)** Study of chemical equilibria in aqueous systems, especially natural waters; acids and bases, dissolved CO_2 , precipitation and dissolution, oxidation-reduction, adsorption, etc. *Preq:* CH 102 or 106.
- CH 414, 614 Bioanalytical Chemistry 3(3,0)** Survey of selected areas of importance in bioanalytical chemistry. Fundamental principles, advanced topics, and applications of analytical measurements of biomolecules, bioassays, immunoassays, separations, mass spectrometry, method validation, macromolecular crystallography, microscopy, and imaging. *Preq:* CH 313, 411, or consent of instructor.
- CH 421, H421, 621 Advanced Organic Chemistry 3(3,0)** Survey of modern organic chemistry emphasizing synthesis and mechanisms. *Preq:* CH 224, 332, or equivalent.

- CH 425, 625 Medicinal Chemistry 3(3,0)** Survey of the pharmaceutical drug discovery process. Covers discovery of candidate compounds, bioassay methods, and associated regulatory and commercial issues. Case studies are selected from the current literature. *Preq:* CH 224 or equivalent or consent of instructor.
- CH 427, H427, 627 Organic Spectroscopy 3(2,3)** Survey of modern spectroscopic techniques used in the determination of molecular structure. Emphasizes the interpretation of spectra: nuclear magnetic resonance, ultraviolet, infrared, mass spectroscopy, optical rotatory dispersion, and circular dichroism. *Preq:* One year each of organic chemistry and physical chemistry.
- CH 435, H435, 635 Atomic and Molecular Structure 3(3,0)** Introduction to quantum theory and its application to atomic and molecular systems. Topics include harmonic oscillator, hydrogen atom, atomic and molecular orbital methods, vector model of the atom, atomic spectroscopy, and molecular spectroscopy. *Preq:* CH 332 or consent of instructor.
- CH 443, H443 Research Problems 1-6(0,3-18)** Original investigation of an assigned problem in a fundamental branch of chemistry. Work must be carried out under the supervision of a member of the staff. May be repeated for a maximum of six credits. *Preq:* Senior standing in Chemistry or consent of instructor.
- CH 444, H444 Research Problems 1-6(0,3-18)** Continuation of CH 443. Original investigation of an assigned problem in a fundamental branch of chemistry. Work must be carried out under the supervision of a member of the staff. May be repeated for a maximum of six credits. *Preq:* Senior standing in Chemistry or consent of instructor.
- CH 450 Chemistry Capstone 3(1,6)** Students undertake capstone projects in a team format. Projects necessitate the use of electronic and print resources, demonstrate expertise with a specific instrument or experimental technique, require strong collaboration within a team setting, and produce a peer-reviewed oral and written report. *Preq:* Senior standing or consent of instructor.
- CH 451, 651 Frontiers in Polymer Chemistry 3(3,0)** Survey of selected areas of current research in polymer science with particular emphasis on polymer synthesis. Although a text is required for review and reference, course is primarily literature based and focused on areas of high impact to multidisciplinary technology. *Preq:* CH 223, 224, PFC 415 or consent of instructor.
- CH 452 Chemistry Communication II 1(1,0)** Methods for scientific communication, including oral, written, and electronic formats. Student presentations focus on current chemical literature topics pertinent to their CH 443/444 undergraduate research or results of that work are appropriate. *Preq:* CH 152.
- CH 471, 671 Teaching Chemistry 3(3,0)** Study of topics in chemistry addressed in the context of constructivist methodologies. Also considers laboratory work and management, laboratory safety, and the use of technology in the chemistry classroom. *Preq:* 300-level chemistry course or high school teaching experience or consent of instructor.
- CH 499 Creative Inquiry—Chemistry IV 1-4(1-4,0)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.
- ## CHINESE
- Associate Professors:* Y. An, Y. Zhang; *Lecturer:* S. Chen
- CHIN 101 Elementary Chinese 4(3,1)** Introductory course stressing speaking, listening, and writing. Attention is given to the sound system of Chinese to enable students to distinguish the four tones and to develop basic communication skills. Participation in cultural activities is encouraged.
- CHIN 102 Elementary Chinese 4(3,1)** Continuation of CHIN 101. *Preq:* CHIN 101 or consent of instructor.
- CHIN 201 Intermediate Chinese 3(3,1)** Intermediate course with more emphasis on communication skills and structure. Reading and writing practice without phonetic aids; oral practice in and outside the class, paying special attention to idiomatic usage; introduction to cultural perspectives through readings and cultural activities. *Preq:* CHIN 102 or consent of instructor.
- CHIN 202 Intermediate Chinese 3(3,1)** Continuation of CHIN 201. *Preq:* CHIN 201 or consent of instructor.
- CHIN 203 Chinese Reading and Composition I 4(3,1)** Designed for students who already speak Chinese but cannot read and write it well. Covers grammatical points of first-year Chinese with special attention to reading and composition. *Preq:* Consent of instructor.
- CHIN 204 Chinese Reading and Composition II 4(3,1)** Continuation of CHIN 203. Covers all grammatical points of regular second-year Chinese. Through reading and discussion of materials regarding Chinese linguistics, history, literature, and philosophy, students improve their language skills and acquire a basic knowledge of Chinese culture. *Preq:* CHIN 203 or consent of instructor.
- CHIN 297 Creative Inquiry—Chinese 1-4(1-4,0)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Arrangements with faculty members must be established prior to registration.
- CHIN 305 Chinese Conversation and Composition I 3(3,0)** Practice in the spoken language emphasizing vocabulary, word combinations, pronunciation, and comprehension. Learning practical language skills and intercultural communication by studying various topics. *Preq:* CHIN 202, 204, or consent of department chair.
- CHIN 306 Chinese Conversation and Composition II 3(3,0)** Continuation of CHIN 305. More practice in the spoken language emphasizing vocabulary, word combinations, pronunciation, and comprehension. Learning practical language skills and intercultural communication by studying various topics. *Preq:* CHIN 305 or consent of department chair.
- CHIN (PHIL) 312 Philosophy in Ancient China 3(3,0)** See PHIL 312.
- CHIN (PHIL) 313 Philosophy in Modern China 3(3,0)** See PHIL 313.
- CHIN 316 Chinese for International Trade I 3(3,0)** Study of spoken and written Chinese common to the Chinese-speaking business communities emphasizing business practices and writing/translating business letters and professional documents. Cross-cultural references are provided for comparative analyses of American and Chinese business behavior. Classes are conducted in Chinese. *Preq:* CHIN 202, 305 (or concurrent enrollment) or consent of department chair.
- CHIN 317 Chinese for Health Professionals I 3(3,0)** Study of medical concepts and terminology emphasizing communicative competence in health-related settings in a Chinese-speaking community. Designed for students who plan to work in public health related professions. *Preq:* CHIN 202, 305, or consent of instructor.
- CHIN 397 Creative Inquiry—Chinese 1-4(1-4,0)** Students focus on a special research area under the guidance of a faculty member. After acquiring the requisite background, students formulate hypotheses for a group project, develop a critical framework, and initiate research on a specific topic.
- CHIN 398 Directed Reading 3(3,0)** Directed readings in Chinese literature, language, society, and culture. Taught in Chinese. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.
- CHIN 401 Pre-Modern Chinese Literature in Translation 3(3,0)** Chinese literature from 8th century B.C.E. to 19th century C.E., including poetry, prose, drama, fiction, and literary criticism. All readings and discussions are in English.
- CHIN 411 Studies in the Chinese Language I: Literature 3(3,0)** Advanced training in the spoken and written language through readings in contemporary literature emphasizing vocabulary, syntax, and stylistics. All readings and discussions are in Chinese. *Preq:* CHIN 306 or consent of instructor.
- CHIN 412 Studies in the Chinese Language II: Social Issues 3(3,0)** In-depth study of terminology and syntax for specific subject areas in contemporary social issues. All readings and discussions are in Chinese. *Preq:* CHIN 306 or consent of instructor.
- CHIN 416 Chinese for International Trade II 3(3,0)** Study of language, concepts, and the environment of Chinese-speaking markets of the world. Considers sociocultural, political, and economic issues relevant to the Chinese-speaking business world and the ramifications of these issues in global marketing. Classes are conducted in Chinese. *Preq:* CHIN 316 or consent of department chair.
- CHIN 417 Chinese for Health Professionals II 3(3,0)** Continuation of CHIN 317 with increased emphasis on managerial aspects of the health-care system in China. Taught in Chinese. *Preq:* CHIN 317 or consent of instructor.

CHIN (ANTH) 418 Chinese Culture and Society 3(3,0) Examines basic cultural values and the patterns of Chinese social life. Focuses on Chinese social organization and interpersonal dynamics, including the family system, gender identities, social exchanges and networks. All readings and discussions are in English. May not be used to satisfy general foreign language requirements.

CHIN 497 Creative Inquiry—Chinese 1-4(1-4,0) Continuation of research initiated in CHIN 397. Students complete their projects and disseminate their research results. *Preq:* CHIN 397 or consent of instructor.

CHIN 498 Independent Study 1-3(1-3,0) Supervised study and research on selected topics in Chinese studies. May be repeated for a maximum of six credits. *Preq:* Junior standing and consent of department chair.

CHIN 499 Selected Topics in Chinese Culture 3(3,0) Examination of various social and cultural topics, including art and literature, philosophical and religious traditions, health and healing, and folk and popular cultures. May be repeated for a maximum of six credits, but only if different topics are covered. Readings and discussions are in English. May not be used to satisfy general foreign language requirements.

CITY AND REGIONAL PLANNING

Professors: M. Lauria, J. B. London, D. J. Nadenicek, *Chair*; B. C. Nocks; *Associate Professors:* M. G. Cunningham, J. T. Farris, S. L. Sperry; *Visiting Assistant Professor:* C. A. Schively; *Lecturer:* R. W. Bainbridge; *Adjunct Professor:* G. A. Vander Mey

C R P 401, 601 Introduction to City and Regional Planning 3(3,0) Introduces students from other disciplines to city and regional planning. Spatial and nonspatial areas of the discipline are explored through a wide ranging lecture/seminar program. *Preq:* Consent of instructor.

C R P 402, 602 Human Settlement 3(3,0) Overview of forces and trends affecting community growth and change—historical, ecological, economic, demographic, design, and development—pertaining to human settlement patterns and their interrelationship in the urbanization process, especially at the national, regional, townscape, and neighborhood scale. Team-taught from various perspectives. Intended as a foundation core course for Master's in Real Estate Development, City and Regional Planning, and Landscape Architecture. *Preq:* Consent of instructor.

C R P 403, 603 Seminar on Planning Communication 3(3,0) In-depth analysis of methods to communicate planning and policy decisions effectively. Familiarizes students with the various communication skills needed by planners, policy makers, and other professionals to become successful practitioners. *Preq:* Consent of instructor.

C R P (C E) 412, 612 Urban Transportation Planning 3(3,0) See C E 412.

C R P 434, 634 Geographic Information Systems for Landscape Planning 3(1,6) Develops competence in geographic information systems technology and its application to various spatial analysis problems in landscape planning. Introduces basic principles of GIS and their use in spatial analysis and information management. Topics include database development and management, spatial analysis techniques, cartography, critical review of GIS applications, and hands-on projects.

CIVIL ENGINEERING

Professors: S. N. Amirkhanian, N. M. Aziz, *Chair*; L. C. Bell, J. L. Burati, C. H. Juang, S. D. Schiff; *Associate Professors:* R. D. Andrus, H. S. Atamturktur, M. A. Chowdhury, A. A. Khan, P. R. Rangaraju, W. A. Sarasua, F. Y. Testik; *Assistant Professors:* N. B. Kaye, L. E. Klotz, B. G. Nielson, J. H. Ogle, W. Pang, B. J. Putman, N. Ravichandran; *Senior Lecturers:* S. F. Csernak, M. M. Sternhagen

C E 199 Creative Inquiry—Civil Engineering 1-4 (1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of four credits.

C E 201, H201 Statics 3(3,0) Forces and force systems and their external effect on bodies, principally the condition of equilibrium. The techniques of vector mathematics are employed, and the rigor of physical analysis is emphasized. *Preq:* PHYS 122, MTHSC 206 (or concurrent enrollment).

C E 204 Civil Engineering and Society 3(2,2) Study of the history and societal impact of major civil engineering projects such as bridges, buildings, dams, tunnels, water supply systems, and transportation systems. Projects are examined in the light of modern concerns for safety, ethics, and their economic and environmental impacts. *Preq:* Sophomore standing or consent of instructor.

C E 206 Structural Mechanics 4(3,3) Builds on statics to develop relationships between external loads on structural elements of civil engineering interest and the resulting internal loads and deformations. Students are exposed to the development of stress and deformation formulas and the identification and use of significant mechanical properties of civil engineering materials. *Preq:* C E 201. *Coreq:* ENGR 130.

C E 208 Dynamics 2(2,0) Study of kinetics and kinematics of particles and rigid bodies, work and energy, impact and momentum. *Preq:* C E 201 and PHYS 122. *Coreq:* MTHSC 206.

C E 251 Analysis Techniques in Civil Engineering 3(2,3) Solution to civil engineering problems using the techniques of dimensional analysis, data analysis, and numerical analyses. The latter includes introduction to FORTRAN programming, simulation analysis, and the numerical solution of systems of linear algebraic equations. *Preq:* ENGR 120. *Coreq:* MTHSC 206.

C E 253 Civil Engineering Measurements 2(3,0) Principles and methods for measurement of loads, load effects, environmental variables, and performance of civil engineering systems. Classes integrate lectures and hands-on applications. Exercises provide students an introduction to sensors, basic electrical circuits, data acquisition systems, and data analysis methods used in civil engineering.

C E 255 Geomatics 3(2,3) Spatial data collection methods, including surveying, digital photogrammetry and remote sensing, and global positioning systems. Methods and technologies used to manage, manipulate, and analyze spatial and associated attribute data, including geographic information systems. *Coreq:* E G 209.

C E 299 Creative Inquiry—Civil Engineering 1-4 (1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of four credits.

C E 301 Structural Analysis 3(3,0) Calculation of design loads for buildings and other structures. Use of classical analysis techniques to determine support reactions, internal member forces, and structural displacements of statically determinate and indeterminate structural systems. *Preq:* C E 206 or consent of instructor.

C E 311 Transportation Engineering Planning and Design 3(3,0) Covers planning, design, and operation of transportation facilities, including highways and airports. Includes economic, safety, and environmental considerations. Public transit systems are covered. *Preq:* C E 255. *Coreq:* EX ST 301.

C E 321 Geotechnical Engineering 4(3,3) Mechanical and physical properties of soils and their relation to soil action in problems of engineering, such as classification, permeability, shearing strength, and consolidation: design of embankments and retaining walls with geotextiles. *Preq:* C E 206 and ENGR 130.

C E 331 Construction Engineering and Management 3(3,0) Considers construction contracts, technical specifications, cost estimating, project scheduling, cost control, materials management, quality control, and quality assurance. *Preq:* Junior standing.

C E 341 Introduction to Fluid Mechanics 4(3,3) Introduction to fluid mechanics, including hydrostatics and fluid flow. Includes principles of mass, momentum, and energy conservation. Other topics include conduit flow, pump systems, and open channel flow. Laboratory experiments familiarize students with laboratory techniques and instrumentation. The Effective Technical Communications Laboratory is used to prepare a presentation for a lab assignment. *Preq:* C E 208 or E M 202.

C E 342 Applied Hydraulics and Hydrology 3(3,0) Study of hydrologic cycle, including precipitation, evapotranspiration, infiltration, and runoff. Includes hydrograph analysis, gradually varied flow in open channel flow, design of stable channels, flood routing, groundwater hydraulics, flood frequency analysis, and hydrologic design. *Preq:* C E 341.

- C E 351 Civil Engineering Materials 4(3,3)** Introduces students to material science and basic properties of construction materials such as aggregate, Portland cement, asphalt cement, concrete, steel, ceramics, wood, and fibers. Experiments in lab and field trips to nearby plants are required. Oral and written communication skills are an integral part of this course. *Preq:* ENGR 130; *Coreq:* EX ST 301 or MTIIS 302.
- C E 352 Economic Evaluation of Projects 2(2,0)** Comparison of design alternatives based on engineering economic analysis. Introduces present worth, annual cost, rate of return, and benefit-cost ratio methods. Use of depreciation and taxation in project analysis.
- C E 353 Professional Seminar 1(1,0)** Discusses various professional topics related to skills and techniques for evaluating career opportunities, seeking and obtaining civil engineering employment, career development, professional registration, professional ethics, and other factors necessary for achieving success in a professional career. Enables students to make better decisions that will help them succeed in their careers. *Preq:* Junior standing.
- C E H387 Junior Honors Project 1-3** Studies or laboratory investigations on special topics in the civil engineering field which are of interest to individual students and faculty members. Arranged on a project basis for a maximum of individual student effort under faculty guidance. May be repeated for a maximum of three credits. *Preq:* Junior standing in Civil Engineering Senior Departmental Honors Program.
- C E H388 Honors Research Topics 1(0,2)** Survey of ongoing research in the Civil Engineering Department to identify potential research topics for further individual study. *Preq:* Junior standing in Civil Engineering Senior Departmental Honors Program.
- C E H389 Honors Research Skills 1(1,0)** Research problem selection, research tools, research reports organization. *Preq:* C E H388.
- C E 399 Creative Inquiry—Civil Engineering 1-4 (14,0)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of four credits.
- C E 401, 601 Indeterminate and Matrix Structural Analysis 3(3,0)** Analysis of indeterminate structures using moment distribution, energy methods such as virtual work and Castigliano's Theorem and the matrix formulation of the direct stiffness method. *Preq:* C E 301 or consent of instructor.
- C E 402 Reinforced Concrete Design 3(3,0)** Design of reinforced concrete beams, slabs, columns, and footings using ultimate strength design. Includes an introduction to working stress design methods. *Preq:* C E 301 or consent of instructor.
- C E 404, 604 Masonry Structural Design 3(3,0)** Introduction to design of structural elements for masonry buildings, including lintels, walls, shear walls, columns, pilasters, and retaining walls. Reinforced and unreinforced elements of concrete or clay masonry are designed by allowable stress and strength design methods. Introduces construction techniques, materials, and terminology used in masonry. *Preq:* C E 402 or consent of instructor.
- C E 406 Structural Steel Design 3(3,0)** Introduction to the design of structural elements found in steel buildings, in particular the design of steel tension members, beams, columns, beam-columns, and connections. Emphasizes the AISC-LRFD Specifications for steel design, though reference is made to the ASD Specification with comparisons made where appropriate. *Preq:* C E 301 or consent of instructor.
- C E 407, 607 Wood Design 3(3,0)** Introduction to wood design and engineering; properties of wood and wood-based materials; design of beams, columns, walls, roofs, panel systems, and connections. *Preq:* C E 402 or 406, or consent of instructor.
- C E 408, 608 Structural Loads and Systems 3(3,0)** In-depth discussion of minimum design loads and load combinations. Includes overview of various steel and concrete systems. Discusses practical selection and design issues and design of proprietary building materials and components such as steel joists, diaphragms, engineered wood products, etc. *Preq:* C E 206, 301.
- C E 410, 610 Traffic Engineering: Operations 3(3,0)** Basic characteristics of motor-vehicle traffic, highway capacity, applications of traffic control devices, traffic design of parking facilities, engineering studies, traffic safety, traffic laws and ordinances, and public relations. *Preq:* C E 311 or consent of instructor.
- C E 411, 611 Roadway Geometric Design 3(2,3)** Geometric design of roadways, at-grade intersections, and interchanges in accordance with conditions imposed by driver ability, vehicle performance, safety, and economics. *Preq:* C E 311 or consent of instructor.
- C E (C R P) 412, 612 Urban Transportation Planning 3(3,0)** Consideration of urban travel characteristics, characteristics of transportation systems, transportation and land-use studies, trip distribution and trip assignment models, city patterns and subdivision layout. *Preq:* C E 311 or consent of instructor.
- C E 421, 621 Geotechnical Engineering Design 3(3,0)** Study of the relationship of local geology to soil formations, groundwater, planning of site investigation, sampling procedures, determination of design parameters, foundation design, and settlement analysis. *Preq:* C E 321 or consent of instructor.
- C E 424, 624 Earth Slopes and Retaining Structures 3(3,0)** Considers the principles of geology, groundwater and seepage, soil strength, slope stability, and lateral earth pressure and their application to the design of excavations, earth fills, dams, and earth-retaining structures. *Preq:* C E 321 or consent of instructor.
- C E 433, 633 Construction Planning and Scheduling 3(3,0)** Study of principles and applications of the Critical Path Method (CPM) and Project Evaluation and Review Techniques (PERT). Includes project breakdown and network graphics; identification of the critical path and resulting floats; definition and allocation of materials, equipment, and manpower resources; resource leveling, compression, and other network adjustments; and computer applications using packaged routines. *Preq:* C E 331 or consent of instructor.
- C E 434, 634 Construction Estimating and Project Control 3(3,0)** Instruction in specifications, contracts, and bidding strategies; purchasing and subcontracting policies; accounting for materials, supplies, subcontracts, and labor; procedural details for estimating earthwork, reinforced concrete, steel, and masonry. Also considers overhead and profit items. *Preq:* C E 331 or consent of instructor.
- C E 436, 636 Sustainable Construction 3(3,0)** Presents the "why," "what" and "how" for sustainable construction projects. Students gain a working understanding of how to minimize the negative impacts of buildings and other large construction projects. *Preq:* C E 331 or consent of instructor.
- C E 438, 638 Construction Support Operations 3(3,0)** Describes activities necessary for the completion of a construction job although not specifically recognized as direct construction activities: general conditions, safety, security, quality assurance, value engineering; organizational support features and typical implementation procedures. *Preq:* C E 331 and EX ST 301, or consent of instructor.
- C E 443, 643 Water Resources Engineering 3(3,0)** Extension of the concepts of fluid mechanics to applications in water supply, water resource assessment, water transmission, water distribution networks, pump and pipe selection, pipe networks, and analysis of open channel appurtenances. *Preq:* C E 341.
- C E 446, 646 Flood Hazards and Protective Design 3(3,0)** Study of flood hazards and methods of protective design of the built environment; floodplain mapping and delineation; methods for determining base flood elevations. Discusses flood-resistant construction, flood proofing, and governmental regulations. Includes case studies and design projects. *Coreq:* C E 342 or consent of instructor.
- C E 447, 647 Stormwater Management 3(3,0)** Evaluation of peak discharges for urban and rural basins, design of highway drainage structures such as inlets and culverts; stormwater and receiving water quality; best management practices, detention and retention ponds, and erosion and sediment control. *Preq:* C E 342; *Coreq:* EE&S 401 or consent of instructor.
- C E 448, 648 Physical Models in Hydraulics 3(2,3)** Tools and techniques of physical modeling to aid in design of complex hydraulic systems. Students participate in construction, operation, and testing of physical models to solve hydraulic engineering design problems. Experimental design and operation are covered. *Preq:* C E 342 or consent of instructor.
- C E 449, 649 Hydraulic Structures 3(3,0)** Design methods and procedures are taught for a variety of hydraulic structures, including intake structures, complex open-channel and closed conduit control structures, transitions, spillways, small dam, and pond design. Field trips to actual hydraulic structures may be included. *Preq:* C E 342 or consent of instructor.
- C E 455, 655 Properties of Concrete and Asphalt 3(2,3)** Properties of aggregate, concrete, and asphalt are discussed. Concrete and asphalt mix designs are conducted in the laboratory. *Preq:* C E 351 and EX ST 301, or consent of instructor.

C E 456 Pavement Design and Construction 3(3,0) Introduction to design methods, construction practices, maintenance strategies, and decision making process related to pavements. Other topics, such as environmental considerations and special pavement types and materials, are also covered. *Preq:* C E 311 and 351 or equivalent; *Coreq:* C E 321 or equivalent.

C E 457 Materials Testing and Inspection 3(3,0) Introduction to the role of testing and inspection professionals in civil engineering projects. Uses a practical approach to applying concepts to real-world situations through the completion of several team projects such as material characterization, construction QC/QA, forensic evaluation, and proposal development. *Preq:* C E 321 and 351 or equivalent.

C E 459 Capstone Design Project 3(1,6) Students apply creativity with their engineering knowledge in the solution of open-ended civil engineering problems. Problems are formulated and solutions are evaluated by faculty and practicing engineers. Communication skills are developed through presentations, correspondence and project reports. *Preq:* All required 300-level C E courses and a Technical Design Requirement.

C E 462, 662 Coastal Engineering I 3(3,0) Introduction to coastal and oceanographic engineering principles, including wave mechanics, wave-structure interaction, coastal water-level fluctuations, coastal-zone processes, and design considerations for coastal structures and beach nourishment projects. *Preq:* C E 341 or consent of instructor.

C E 482, 682 Groundwater and Contaminant Transport 3(3,0) Basic principles of groundwater hydrology and transport of contaminants in groundwater systems; groundwater system characteristics; steady and transient flow; well hydraulics, design, and testing; contaminant sources, movement and transformations. *Preq:* C E 341. *Coreq:* EE&S 401.

C E H487 Senior Honors Project 1-3 Studies or laboratory investigations on special topics in civil engineering which are of interest to individual students and faculty members. Arranged on a project basis for a maximum of individual student effort under faculty guidance. May be repeated for a maximum of three credits. *Preq:* Senior standing in Civil Engineering Senior Departmental Honors Program.

C E H488 Honors Research I 2-3 Individual research under the direction of a Civil Engineering faculty member. *Preq:* C E H389.

C E H489 Honors Research II 3(3,0) Individual research under the direction of a Civil Engineering faculty member. *Preq:* C E H488

C E 490 Special Projects 1-3(1-3,0) Studies or laboratory investigations on special topics in civil engineering which are of interest to individual students and staff members. Arranged on a project basis with a maximum of individual student effort and a minimum of staff guidance. May be repeated for a maximum of three credits. *Preq:* Senior standing.

C E 491, 691 Selected Topics in Civil Engineering 1-6(1-6,0) Structured study of civil engineering topics not found in other courses. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of instructor.

C E 499 Creative Inquiry—Civil Engineering 1-4 (1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of four credits.

CLEMSON UNIVERSITY

C U 101 University Success Skills 2(3,0) Introduction to a variety of topics critical to students' success. Topics include time management, goal setting, test taking, campus resources and policies, critical thinking, and diversity. Students are given opportunities to discover and practice many procedures, techniques, and tips. Limited to freshmen and first semester transfer students.

COLLEGE OF ARCHITECTURE, ARTS AND HUMANITIES

CAAH 201 Cultural Literacies Across Media 3(3,0) Hands-on practicum course in which students reflect critically on the cultural, aural, visual, professional and technological literacies learned as a result of a semester-long study abroad experience. May be repeated for a maximum of six credits. *Preq:* Enrollment in a study abroad program and ENGL 103, or consent of instructor.

COLLEGE OF ENGINEERING AND SCIENCE

CES 101 Engineering Disciplines and Skills with Recitation 3(2,3) Introduction to engineering disciplines. Students study spreadsheets and obtain graphical solutions. They complete team-based design projects. Provides a recitation for students who are not calculus-ready. Credit toward degree will be given for only one of CES 101 or 102. *Coreq:* MTHSC 103 or 105.

CES 102, H102 Engineering Disciplines and Skills 2(1,2) Provides solid foundation of skills to solve engineering problems. Students demonstrate problem solving techniques with spreadsheets, dimensions and units; use modeling techniques and interpret validity of experimental results. Students design projects on multi-discipline teams. Introduces professional and societal issues appropriate to engineering. Various forms of technical communication are emphasized. *Coreq:* MTHSC 104 or 106.

CES 110 Engineering and Science Workshop 1(0,2) Workshop that addresses issues and opportunities for women in science and engineering. Designed to help students succeed in engineering and science by strengthening their problem-solving, leadership, and teamwork skills and by introducing them to female role models and mentors in engineering and science.

CES 190, H190 Creative Inquiry in Engineering and Science I 1-3(1-3,0) Individual or group projects in engineering and/or science. Projects may be interdisciplinary and involve analysis, design, and/or implementation. Instruction in methods, tools, and equipment will be included when appropriate. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

CES 290, H290 Creative Inquiry in Engineering and Science II 1-3(1-3,0) Individual or group projects in engineering and/or science. Projects may be interdisciplinary and involve analysis, design, and/or implementation. Instruction in methods, tools, and equipment will be included when appropriate. May be repeated for a maximum of six credits. *Preq:* Sophomore standing and consent of instructor.

CES 390, H390 Creative Inquiry in Engineering and Science III 1-3(1-3,0) Individual or group projects in engineering and/or science. Projects may be interdisciplinary and involve analysis, design, and/or implementation. Instruction in methods, tools, and equipment will be included when appropriate. May be repeated for a maximum of six credits. *Preq:* Junior standing and consent of instructor.

CES 403, 603 Career Success in Research and Development 1(1,0) Assists students in making personal and professional transition into industrial research careers. Introduces and demonstrates practical advice and techniques to help students avoid early career land mines. *Preq:* Junior standing in engineering or science discipline.

CES 490, H490 Creative Inquiry in Engineering and Science IV 1-3(1-3,0) Individual or group projects in engineering and/or science. Projects may be interdisciplinary and involve analysis, design, and/or implementation. Instruction in methods, tools, and equipment will be included when appropriate. May be repeated for a maximum of six credits. *Preq:* Senior standing and consent of instructor.

COMMUNICATION STUDIES

Professors: B. E. Denham, K. W. Hawkins, *Chair*; *Associate Professor:* A. C. Billings; *Assistant Professors:* S. L. Holland, K. O. Jones, D. R. Novak, D. P. Wolfe; *Lecturers:* A. C. Billings, D. B. Conley, A. Z. Davis, M. D. Drye, C. P. Dupre, M. H. Glaser, H. E. Hoover, C. A. Lossie, C. S. Parsons, E. R. Smith, J. S. Wood

COMM 101 Communication Academic and Professional Development I 1(1,0) Introduces students to General Education and Communication Studies major requirements, explains connections between general education and major courses, explores careers in communication, and prepares students to develop digital portfolios, résumés, and interview skills specific to communication professions and/or graduate school. To be taken Pass/Fail only.

COMM 107 Media Representations of Science and Technology 3(3,0) Examines mediated representations of science and technology from a communication perspective. Attention is paid to portrayals/coverage of science and technology in popular film, television, Internet, journalism, and other media. Students examine an array of theoretical issues and case studies in this area.

COMM 150 Introduction to Human Communication 3(2,2) Overview of theoretical approaches to the study of communication, including the theory and practice of interpersonal/small group/intercultural/public communication. Includes a laboratory.

COMM 162 Forensic Laboratory 1(0,3) Research, preparation, and practice leading to participation in on-campus and intercollegiate debate and individual events competition. May be repeated for a maximum of four credits.

- COMM 163 Advanced Forensic Laboratory 1(0,3)** Advanced research, preparation, and practice leading to continued participation in on-campus and intercollegiate debate and individual events competition. May be repeated for a maximum of four credits. *Preq:* COMM 162.
- COMM 201 Introduction to Communication Studies 4(3,2)** Introduces Communication Studies majors to and prepares them for continued study in the discipline by providing them with an overview of important issues, areas of study, and approaches to the field. Includes a writing laboratory experience. *Preq:* COMM 101.
- COMM 250, H250 Public Speaking 3(3,1)** Practical instruction in public speaking; practice in the preparation, delivery, and criticism of short speeches. Develops an understanding and knowledge of the process of communication. Includes a laboratory.
- COMM 300 Communication in a World Context 3(3,0)** In-depth examination of differences in communication practices and meanings seen through a global perspective. *Preq:* COMM 201 with a C or better or consent of instructor.
- COMM 301 Communication Theory 3(3,0)** Students explore the breadth and depth of theories within the major frameworks of the communication studies discipline. *Preq:* COMM 201 with a C or better.
- COMM 302 Mass Communication Theory 3(3,0)** Survey of the breadth and history of theories of mass communication and mass media from the 19th century to the present. Emphasizes contemporary schools of thought, theoretical debates, and the continuing controversies in the field. *Preq:* COMM 201 with a C or better or consent of instructor.
- COMM 303 Communication Law and Ethics 3(3,0)** Major topics in communication law and free expression and in communication ethics. *Preq:* COMM 201 with a C or better or consent of instructor.
- COMM 304 Youth, Media, and Culture 3(3,0)** Grounded in the cultural studies paradigm, examines the relationship among youth, mass media, and popular culture. Focuses on issues such as how youth are portrayed in media, how youth navigate the products of mass media/culture, and how youth creates its own media culture. *Preq:* COMM 201 with a C or better or consent of instructor.
- COMM 305 Persuasion 3(3,0)** Study of the processes by which communication influences attitudes, beliefs, and behaviors in our personal, social, civic, and professional lives. After discussion of definitional and methodological issues, particular theories of persuasion are examined. Treatment of political, market-driven, and social persuasion concludes the course. *Preq:* COMM 201 with a C or better or consent of instructor.
- COMM 306 Discourse, Criticism, and Society 3(3,0)** Students explore theoretically-grounded methods of critical and cultural description, analysis, interpretation, and evaluation of public discourse. *Preq:* COMM 201 with a C or better.
- COMM 307 Public Communication of Science and Technology 3(3,0)** Examines the role of science and technology in society from a communication perspective. Particular attention is paid to this dynamic in public culture. Students examine an array of theoretical issues and case studies in this area. *Preq:* COMM 201 with a C or better or consent of instructor.
- COMM 308 Public Communication and Popular Culture 3(3,0)** Examines artifacts of popular culture, paying particular attention to their relationship to politics and public life. Explores the structures and constraints of the culture industry. Students apply communication principles to various examples. *Preq:* COMM 201 with a C or better or consent of instructor.
- COMM 309 Visual Discourse and the Public 3(3,0)** Examines the role of visuality in society and the cultural implications for ways of seeing. Using visual artifacts of various types, students learn the logic of visual representation. *Preq:* COMM 201 with a C or better or consent of instructor.
- COMM 310 Quantitative Research Methods in Communication Studies 3(3,0)** Explores methods of quantitative communication inquiry, including theory/research relationship, conducting studies, and utilizing statistical software. Methods may include experiments, surveys, and content analysis. *Preq:* COMM 201 with a C or better.
- COMM 311 Qualitative Research Methods in Communication Studies 3(3,0)** Explores methods of qualitative communication inquiry, including theory/research relationship and conducting studies. Methods may include interviewing, focus groups, textual analysis, and ethnography. *Preq:* COMM 201 with a C or better.
- COMM 315 Critical Discourse Theory 3(3,0)** Introduction to a variety of theoretical concepts associated with the critical study of public discourse. Students analyze theories related to the strategic use of language and its epistemological characteristics. Theoretical topics may include critical/cultural studies, visual communication, ideology, persona, social change, and identity studies. *Preq:* COMM 201 with a C or better.
- COMM (W S) 316 Girlhood, Media, and Popular Culture 3(3,0)** Explores how the mass media and popular culture contribute to social constructions of girlhood. Employing the critical lens of feminist and communication theories, students examine mediated depictions of girls as well as how girls actively produce and negotiate media and popular culture. *Preq:* COMM 201 with a C or better or W S 301 or consent of instructor.
- COMM 320 Electronic Journalism 3(2,2)** Explores both the philosophy of journalism and the applied skills of the journalist. Students produce news content in a variety of electronic formats.
- COMM 325 Sports Communication 3(3,0)** Covers fundamentals of communicating in a sports environment. Includes the basics of communicating for print and broadcast news, as well as communicating for public relations and sports information. Also covers ethical considerations and the role of sports in American culture. *Preq:* COMM 201 with a C or better or consent of instructor.
- COMM 326 Public Relations in Sports 3(3,0)** Focuses on the preparation of professional sports communication materials for both internal and external audiences. Topics include the mechanics of creating press releases and other materials, as well as techniques in managing crises. *Preq:* COMM 201 with a C or better or consent of instructor.
- COMM 327 Sports Media Criticism 3(3,0)** Students gain in-depth understanding of sports communication issues through critically analyzing actual media coverage of sporting events, addressing social issues involved in college and professional sports, and developing an understanding of sports promotion and advertising. *Preq:* COMM 201 with a C or better or consent of instructor.
- COMM 330 Nonverbal Communication 3(3,0)** Develops a knowledge of the functions of nonverbal behaviors in human interaction. This includes the study of gesture and movement, physical appearance, vocal behavior, immediacy, time and space, and intercultural differences. Promotes understanding of nonverbal rules. *Preq:* COMM 201 with a C or better or consent of instructor.
- COMM 348 Interpersonal Communication 3(3,0)** Survey of the theories and research in interpersonal communication with emphasis on the application of research findings and developmental strategies for intra- and intercultural relationships. *Preq:* COMM 201 with a C or better or consent of instructor.
- COMM 350 Small Group and Team Communication 3(3,0)** Examines the principles and skills involved in effective small-group communication. *Preq:* COMM 201 with a C or better or consent of instructor.
- COMM 355 Principles of Public Relations 3(3,0)** Students learn the principles, theories, process, history and contexts of public relations. *Preq:* COMM 201 with a C or better or consent of instructor.
- COMM 356 Stakeholder Communication 3(3,0)** Focuses on external stakeholders such as the media, the community, and the government. Students learn theory- and research-based communication tactics to manage various stakeholder relationships. *Preq:* COMM 355 or consent of instructor.
- COMM 361 Argumentation and Debate 3(3,0)** Basic principles of argumentation with emphasis on developing skills in argumentative speech. The role of the advocate in contemporary society with an emphasis on and an appreciation of formal debate. *Preq:* COMM 250 or consent of instructor.
- COMM 362 Communication and Conflict Management 3(3,0)** Introduces the study of communication practices in conflict situations within various personal and professional settings. Emphasis is on the central role of communication in the understanding and management of conflict. *Preq:* COMM 201 with a C or better or consent of instructor.
- COMM 364 Organizational Communication 3(3,0)** Examination of the process, theories, and techniques of communications within small groups and other organized bodies. *Preq:* COMM 201 with a C or better or consent of instructor.

COMM 366 Special Topics in Communication Studies 3(3,0) Consideration of select major areas of study in the field. With consent of department chair, may be repeated for a maximum of 15 credits, but only if different topics are covered.

COMM 368 Applied Communication 3(3,0) Students apply communication theory, research and processes to understanding a variety of practical situations and communication contexts. Addresses the history, purpose, practices and ethics of applied communication research. *Preq:* COMM 301 with a C or better and at least one of COMM 306, 310, or 311 with a C or better, or consent of instructor.

COMM 369 Political Communication 3(3,0) Examination of American political rhetoric after 1900, focusing on such notable speakers as Franklin D. Roosevelt, John F. Kennedy, and Martin Luther King Jr. *Preq:* COMM 201 with a C or better or consent of instructor.

COMM 390 Communication Studies Internship 3(0,9) Preplanned, preapproved, faculty-supervised internship provides Communication Studies majors with field experience in areas related to their curriculum. May be repeated for a maximum of six credits. To be taken Pass/Fail only. *Preq:* Junior standing, consent of faculty advisor.

COMM 399 Creative Inquiry in Communication Studies 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue small group work on a particular research topic or practical problem. Arrangements with mentors must be established prior to registration. Content varies. May be repeated for a maximum of nine credits. *Preq:* COMM 201 with a C or better or consent of instructor.

COMM 402 Mass Communication: History and Criticism 3(3,0) Critical examination of mass communication in America, including discussions of history, theory, and current issues in television, film, popular music, telecommunications, and other media. *Preq:* COMM 201 with a C or better or consent of instructor.

COMM 405 Public Contest and Change 3(3,0) Examines the role of public communication in the process of contesting social values and practices and in the subsequent change that sometimes occurs. Students explore the public's relationship with mass media as well as other forms of communication practices that can produce cultural change. *Preq:* COMM 201 with a C or better and 305 or consent of instructor.

COMM 425 Advanced Sports Communication 3(3,0) Combination seminar and primary research class that explores contemporary sports communication issues. Students write position papers on seminar topics and conduct primary research on sports communication topics of their choice. *Preq:* COMM 325 or consent of instructor.

COMM (ENGL) 451, 651 Film Theory and Criticism 3(2,3) See ENGL 451.

COMM 455 Gender Communication 3(3,0) Explores the ways communication behavior and perceptions of communication behavior are affected by gender. The effects of gender on a variety of communication contexts are examined, including interpersonal, small group, organizational, and mass communication. *Preq:* COMM 201 with a C or better or consent of instructor.

COMM 456 Strategic Communication for Social Change 3(3,0) In-depth examination and application of the strategic use of communication for creating social change. *Preq:* COMM 310 or 311; 356; or consent of instructor.

COMM 462 Communication and Negotiation 3(3,0) Building on the concepts and practices of conflict management, students develop knowledge and skills for distributive bargaining and integrative negotiation climates. Focuses on the objectives, goals, positions, interests, tactic, and other elements to negotiate successfully in a variety of situations. *Preq:* COMM 362 or consent of instructor.

COMM 464, 664 Advanced Organizational Communication 3(3,0) Application of speech communication methodology to the analysis of organizational communication processes. Students study methods of organizational communication analysis and intervention. *Preq:* COMM 364 or consent of instructor.

COMM 470, 670 Communication and Health 3(3,0) Considers institutional and health care communication issues as well as the relationship between social issues, communication, and health. *Preq:* COMM 201 with a C or better or consent of instructor.

COMM 480 Intercultural Communication 3(3,0) Introduces the process of communication between and among individuals from different cultures or subcultures. Emphasizes the effect of cultural practices within various communication relational contexts such as interpersonal, small group, and organizational communication. *Preq:* COMM 201 with a C or better or consent of instructor.

COMM (ENGL) 491, 691 Classical Rhetoric 3(3,0) See ENGL 491.

COMM (ENGL) 492, 692 Modern Rhetoric 3(3,0) See ENGL 492.

COMM 495 Creative Inquiry Seminar 3(3,0) In-depth exploration and analysis of a special topic in Communication Studies, culminating in a senior project documented in written, oral, visual and/or multimedia presentations. Topics vary based on faculty expertise and research interests. May be repeated for a maximum of six credits. *Preq:* Senior standing in Communication Studies and COMM 301, 302, or 315 with a C or better.

COMM H496 Honors Creative Inquiry Capstone 3(3,0) Capstone course for honors students in the department's creative inquiry sequence. Working with their departmental honors advisor, students apply theoretical understanding and research skills in completing a written product of conference or publication length/quality. Must be taken for a total of six credits over the course of two semesters. *Preq:* Two of the following: COMM 306, 310, 311 each with a C or better; Senior standing in Communication Studies.

COMM 498 Communication Academic and Professional Development II 1(1,0) Students reflect upon curricular relationships among general education, major, and minor courses. They complete and revise digital portfolios for presentation to the major, University, graduate schools, or potential employers. Students participate in résumé building, job seeking, and interviewing activities. *Preq* or *Coreq:* COMM 495 or H496.

COMM 499 Independent Study 1-3(1-3,0) Tutorial work for students with special interests or projects in communication studies outside the scope of existing courses. May be repeated for a maximum of nine credits. *Preq:* Consent of department chair.

COMMUNITY AND RURAL DEVELOPMENT

See also courses listed under Applied Economics.

Professors: C. E. Curtis Jr., M. Espey, D. W. Hughes;
Associate Professors: R. D. Lamie, S. R. Templeton;
Assistant Professors: K. A. Boys, K. L. Robinson

C R D (SOC) 235 Introduction to Leadership 3(3,0)
See SOC 235.

C R D 335 Leadership in Organizations and Communities 3(3,0) Students present leadership models, principles, skills, negotiation techniques, and practices to improve effectiveness in organizations and communities; use current theory and research findings to evaluate effective leadership; demonstrate the role of effective leadership in shaping future organizations and social structures in public and private sectors. *Preq:* Introductory course in a social science (sociology recommended).

C R D 336 Community Development Methods 3(3,0) Research methodology is applied to community, leadership, and economic development. Steps include problem identification, data collection, analysis, and interpretation. Special attention is given to case study approach, applied research design, data collection options, and computer-based analysis of community-based data to generate findings and implications for policy change. *Preq:* C R D 335, EX ST 301 or equivalent.

C R D (AP EC) 357 Natural Resources Economics 3(3,0) Principles and problems involved in the use of soil, water, forest, and mineral resources, with special emphasis on economic aspects of alternative methods of resource utilization. *Preq:* AP EC 202, ECON 200 or 211.

C R D (AP EC, HLTH) 361 Introduction to Health-Care Economics 3(3,0) Introductory course in which students learn the basic economics of the institutions comprising the health-care industry. Topics include the underlying supply, demand, and institutional factors impacting health-care availability and cost of health care.

C R D (AP EC) 411, 611 Regional Impact Analysis 3(3,0) Techniques for analysis of the growth and decline of regions, including economic-base theory, shift share, regional input-output, regional econometric models, and fixed impact models. *Preq:* AP EC 202 or ECON 211 and 212.

C R D (AP EC) 412, 612 Regional Economic Development Theory and Policy 3(3,0) Development of rural economic activity in the context of historical, theoretical, and policy aspects of friction associated with spatial separation. Considers location factors, transfer costs, location patterns, and regional-growth policy. *Preq:* AP EC 202 or ECON 211 or equivalent.

CR D (AP EC) 491 Internship, Agribusiness, and Community and Rural Development 1-6(0,2-12) Internship under faculty supervision in an approved agency or firm. Internships provide students with work experience in agribusiness or community and rural development. Students submit a comprehensive report within one week of the end of the internship. A maximum of six internship credits may be earned. *Preq:* Junior standing and/or consent of instructor.

CR D 492, 692 Case Study Project 3(3,0) Capstone course engaging students in in-depth case study projects in community and economic development. Designed to enhance professional development, career interests, and practical experience. Students may participate in an internship, field experience, service learning activity, or investigation of a community, leadership, or economic development topic. *Preq:* CR D 336 and consent of instructor.

CR D (AP EC) 494 Creative Inquiry—Community and Rural Development 1-3(1-3,0) Multi-semester commitment to participate in agricultural and applied economics and community and economic development related research experience for students working in teams, mentored and directed by a faculty member. Students learn to collect, analyze, evaluate, and present information. Suitable for inclusion in the student's e-portfolio. May be repeated for a maximum of 12 credits. *Preq:* Consent of instructor.

COMPUTER SCIENCE

Professors: A. T. Duchowski, R. M. Geist III, J. E. Gilbert, *Human-Centered Computing Chair*; S. M. Hedetniemi, S. T. Hedetniemi, L. F. Hodges, *Flagship Endowed Chair and Director, School of Computing*; D. H. House, *Visual Computing Chair*; D. P. Jacobs, M. Sitaraman, P. K. Srimani; J. M. Westall Jr., *Associate Professors:* T. A. Davis, W. Goddard, H. C. Grossman, *Computer Science Interim Chair*; A. W. Madison, B. A. Malloy, J. J. Martin, J. D. McGregor, R. P. Pargas, M. K. Smotherman, D. E. Stevenson, Z. Wang; *Assistant Professors:* S. V. Babu, B. C. Dean, S. Goasguen, J. O. Hallstrom, F. Luo; *Research Assistant Professor:* J. Gemmill; *Lecturers:* C. Hochrine, J. H. Jones, R. S. Lambert, R. M. Lowe, P. D. Sterling, K. A. Weaver

CP SC 101, H101 Computer Science I 4(3,2) Introduction to modern problem solving and programming methods. Special emphasis is placed on algorithm development and software life cycle concepts. Includes use of appropriate tools and discusses ethical issues arising from the impact of computing upon society. Intended for students concentrating in computer science or related fields. *Preq:* MTHSC 105 or satisfactory score on the Clemson Mathematics Placement Test or consent of instructor.

CP SC 102, H102 Computer Science II 4(3,2) Continuation of CP SC 101. Continued emphasis on problem solving and program development techniques. Examines typical numerical, nonnumerical, and data processing problems. Introduces basic data structures. Credit may not be received for both CP SC 102 and 210. *Preq:* CP SC 101 with a C or better.

CP SC 104 Introduction to the Concepts and Logic of Computer Programming 2(1,2) Introduction to the concepts and logic of computer programming. Simple models are used to introduce basic techniques for developing a programmed solution to a given problem. Problem solving techniques are considered. Not open to students who have received credit for CP SC 101, 111, 157, or 210.

CP SC 110, H110 Elementary Computer Programming 3(3,0) Introduction to computer programming and its use in solving problems. Intended primarily for technical majors. Basic instruction in programming techniques is combined with tools use and discussions of ethical issues arising from the impact of computing on society.

CP SC 111 Elementary Computer Programming in C/C++ 3(2,2) Introduction to computer programming in C/C++ and its use in solving problems. Intended primarily for technical majors. Basic instruction in programming techniques is combined with tools use and discussions of ethical issues arising from the impact of computing on society.

CP SC 115 Introduction to Computational Science 3(3,0) Introduction to systems thinking. Includes development of dynamical systems models using visual modeling tools and development of dynamical systems using agent based software. Class material investigates elementary science and engineering models.

CP SC 120 Introduction to Information Technology 3(2,2) Investigation of ethical and societal issues based on the expanding integration of computers into our everyday lives. Considers historical background, terminology, new technologies and the projected future of computers. Includes practical experience with common computer software technologies. Will not satisfy Computer Science Requirements in any Computer Science major.

CP SC 157 Introduction to C Programming 2(2,0) Introduction to basic programming techniques using the C programming language.

CP SC 161 Introduction to Visual Basic Programming 3(2,2) Introduction to programming using the Visual Basic language. Topics include simple and complex data types, arithmetic operations, control flow, files, and database programming. Several projects are implemented during the semester.

CP SC 207 Discrete Structures for Computing 3(3,0) Introduces ideas and techniques from discrete structures that are widely used in the computing sciences. Topics emphasize techniques of rigorous argumentation and application to the computing disciplines. *Preq:* CP SC 101 or 111; and MTHSC 102 or 106; or consent of instructor.

CP SC 210 Programming Methodology 4(3,2) Introduction to programming techniques and methodology. Topics include structured programming, stepwise refinement, program design and implementation techniques, modularization criteria, program testing and verification, basic data structures, and analysis of algorithms. Credit may not be received for both CP SC 102 and 210. *Preq:* CP SC 111 or equivalent; satisfactory performance on a pretest.

CP SC 212 Algorithms and Data Structures 4(3,2) Study of data structures and algorithms fundamental to computer science; abstract data-type concepts; measures of program running time and time complexity; algorithm analysis and design techniques. *Preq:* CP SC 102 or 210 with a C or better.

CP SC 215 Software Development Foundations 3(2,2) Intensive study of software development foundations. Advanced coverage of programming language primitives, function-level design principles, and standard development and debugging tools. Introductory coverage of module-level design principles, program specification and reasoning principles, and validation and verification techniques. *Preq:* CP SC 102 or 210 with a C or better.

CP SC 220 Microcomputer Applications 3(3,0) Applications of microcomputers to formulate and solve problem models. Emphasizes applications development in database and spreadsheet environments. Current software products are used. *Preq:* CP SC 120 or MGT 218 or equivalent.

CP SC 231 Introduction to Computer Organization 4(3,2) Study of the machine architectures on which algorithms are implemented and requirements of architectures that support high-level languages, programming environments, and applications. *Preq:* CP SC 102 or 210 with a C or better.

CP SC 281 Selected Topics in Computer Science 1-4(0-3,0-6) Areas of computer science in which new trends arise. Innovative approaches to a variety of problems in the use and understanding of basic computing concepts are developed and implemented. May be repeated for a maximum of eight credits, but only if different topics are covered. *Preq:* Consent of instructor.

CP SC 291 Seminar in Professional Issues I 1(1,0) Considers the impact of computer use on society. Discusses ethical use of software and protection of intellectual property rights. Profession is viewed historically; organizations important to the profession are discussed; the development process for standards is presented; and students are introduced to the professional literature. *Preq:* CP SC 102 or 210, or consent of instructor.

CP SC (E C E) 322 Introduction to Operating Systems 3(3,0) Detailed study of management techniques for the control of computer hardware resources. Topics include interrupt systems, primitive level characteristics of hardware and the management of memory, processor, devices, and data. Credit may not be received for both CP SC 322 and 332. *Preq:* CP SC 215 and 231 with a C or better, or E C E 223 and 272 with a C or better.

CP SC 330 Computer Systems Organization 3(3,0) Introduction to the structure of computer systems. Various hardware/software configurations are explored and presented as integrated systems. Topics include digital logic, basic computer organization, computer arithmetic, memory organization, input/output organizations, interrupt processing, multiprocessors, and cluster computers. *Preq:* CP SC 212, 215, 231 with a C or better.

CP SC 332 Computer Systems 3(3,0) Introduces design, integration, and use of hardware and software components in standard computer systems. Emphasizes computer organization at the component level, interfacing, basic operating system functions, and system utilities. Credit may not be received for both CP SC (E C E) 322 and 332. *Preq:* CP SC 212, 215, 231 with a C or better.

CP SC 350 Foundations of Computer Science 3(3,0) Development of the theoretical foundations of programming, algorithms, languages, automata, computability, complexity, data structures, and operating systems; a broad range of fundamental topics is consolidated and extended in preparation for further study. *Preq:* CP SC 207 and 212 with a C or better.

CP SC (E C E) 352 Programming Systems 3(3,0) See E C E 352.

CP SC 360 Networks and Network Programming 3(3,0) Introduction to basic concepts of computer network technologies and network programming. Topics include network programming, layered protocol architectures, local and wide area networks, internetwork and intranetwork concepts, security. Socket level programming is introduced and used throughout the course. *Preq:* CP SC 212, 215 with a C or better.

CP SC 361 Data Management Systems Laboratory 1(0,2) Introduces mainframe environments typical of large-scale data processing applications; programming languages, control languages, and file utilities; use of COBOL language and IBM JCL. *Preq:* CP SC 102 or 210; or equivalent. *Coreq:* CP SC 360.

CP SC 362 Distributed and Cluster Computing 3(3,0) Introduction to the basic technology of and programming techniques for distributed and cluster computing. Standard techniques for developing parallel solutions to problems are introduced and implemented. Software systems that provide high-level abstractions for data communications are considered. *Preq:* CP SC 360 with a C or better.

CP SC 371 Systems Analysis 3(3,0) Incorporates a study of the decision-making process at all levels with the logical design of information systems. Extensive study of the system life cycle with emphasis on current as well as classical techniques for describing data flows, data structures, file design, etc. *Preq:* CP SC 360.

CP SC 372 Introduction to Software Engineering 3(3,0) Intensive introduction to software engineering. Focuses on each major phase of the software lifecycle. Introductory coverage of requirements analysis, requirements modeling, design modeling, and project management. Intermediate coverage of module-level design principles, program specification and reasoning principles, and program validation and verification techniques. *Preq:* CP SC 212 and 215 with a C or better.

CP SC H395 Honors Seminar 1(1,0) Research topics in various areas of computer science are presented. Methods for identifying and initiating research projects are considered. May be repeated for a maximum of two credits. *Preq:* Admission to Departmental Honors Program.

CP SC 405, 605 Introduction to Graphical Systems Design 3(3,0) Study of principles, computational techniques, and design concepts needed for designing systems for effective graphical displays. *Preq:* CP SC 212, 215, MTHSC 108, 311 with a C or better.

CP SC 411, 611 Virtual Reality Systems 3(3,0) Design and implementation of software systems necessary to create virtual environments. Discusses techniques for achieving real-time, dynamic display of photorealistic, synthetic images. Includes hands-on experience with electromagnetically-tracked, head-mounted displays and requires, as a final project, the design and construction of a virtual environment. *Preq:* CP SC 405 with a C or better.

CP SC 412, 612 Eye Tracking Methodology and Applications 3(3,0) Introduction to the human visual system; visual perception; eye movements; eye tracking systems and applications in psychology, industrial engineering, marketing, and computer science; hands-on experience with real time, corneal-reflection eye trackers, experimental issues. Final project requires the execution and analysis of an eye tracking experiment. *Preq:* CP SC 360, MKT 431, or PSYCH 310.

CP SC 414, 614 Human and Computer Interaction 3(3,0) Survey of human and computer interaction, its literature, history, and techniques. Covers cognitive and social models and limitations, hardware and software interface components, design methods, support for design, and evaluation methods. *Preq:* CP SC 212 and 215 with a C or better, or equivalent.

CP SC 416, 616 2-D Game Engine Construction 3(3,0) Introduction to tools and techniques necessary to build 2-D games. Techniques draw from subject areas such as software engineering, algorithms, and artificial intelligence. Students employ techniques such as sprite animation, parallax scrolling, sound, AI incorporated into game sprites, and the construction of a game shell. *Preq:* CP SC 212 and 215 with a C or better.

CP SC 420, 620 Computer Security Principles 3(3,0) Covers principles of information systems security, including security policies, cryptography, authentication, access control mechanisms, system evaluation models, auditing, and intrusion detection. Computer security system case studies are analyzed. *Preq:* CP SC (E C E) 322 and 360 with a C or better.

CP SC 424, 634 System Administration and Security 3(3,0) Covers topics related to the administration and security of computer systems. Primary emphasis is on the administration and security of contemporary operating systems. *Preq:* CP SC 360 and (E C E) 322 or 332 with a C or better.

CP SC 428, 628 Design and Implementation of Programming Languages 3(3,0) Overview of programming language structures and features and their implementation. Control and data structures found in various languages are studied. Also includes runtime organization and environment and implementation models. *Preq:* CP SC 231, 350, 360 with a C or better.

CP SC 455, 655 Computational Science 3(3,0) Introduction to the methods and problems of computational science. Uses problems from engineering and science to develop mathematical and computational solutions. Case studies use techniques from Grand Challenge problems. Emphasizes the use of networking, group development, and modern programming environments. *Preq:* MTHSC 108, 311, and previous programming experience in a higher level language.

CP SC 462, H462, 662 Database Management Systems 3(3,0) Introduction to database/data communications concepts as related to the design of online information systems. Problems involving structuring, creating, maintaining, and accessing multiple-user databases are presented and solutions developed. Comparison of several commercially available teleprocessing monitor and database management systems is made. *Preq:* CP SC 360.

CP SC 463, 663 On-line Systems 3(3,0) In-depth study of the design and implementation of transaction processing systems and an introduction to basic communications concepts. A survey of commercially available software and a project using one of the systems are included. *Preq:* CP SC 462.

CP SC 464, 664 Introduction to Computer Architecture 3(3,0) Survey of von Neumann computer architecture at the instruction-set level. Fundamental design issues are emphasized and illustrated using historical and current mainframe, supermini, and micro architecture. *Preq:* CP SC 330 or consent of instructor.

CP SC 472, H472, 672 Software Development Methodology 3(3,0) Advanced topics in software development methodology. Techniques such as chief programmer teams, structured design and structured walk-throughs are discussed and used in a major project. Emphasizes the application of these techniques to large-scale software implementation projects. Also includes additional topics such as mathematical foundations of structured programming and verification techniques. *Preq:* CP SC 360 and 372.

CP SC 481, H481, 681 Selected Topics 1-3(1-3,0) Areas of computer science in which nonstandard problems arise. Innovative approaches to problem solutions which draw from a variety of support courses are developed and implemented. Emphasizes independent study and projects. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of instructor.

CP SC 491 Seminar in Professional Issues II 3(2,2) Considers the impact of computing system development on society. Discusses ethical issues in the design and development of computer software. Students discuss standards for professional behavior, the professional's responsibility to the profession, and techniques for maintaining currency in a dynamic field. *Preq:* Senior standing.

CP SC H495 Senior Thesis Research 1-3(1-3,0) Directed individual research project for honors students supervised by departmental faculty. May be repeated for a maximum of six credits. *Preq:* Senior standing.

CONSTRUCTION SCIENCE AND MANAGEMENT

Professors: R. W. Liska, C. A. Piper; *Associate Professors:* D. C. Bausman, S. N. Clarke, G. R. Corley, R. K. Schneider; *Assistant Professor:* J. A. Wintz

C S M 100 Introduction to Construction Science and Management 3(3,0) Introduction to the construction industry and the Construction Science and Management Department. *Preq:* Construction Science and Management major or consent of department chair.

- C S M 150 Construction Problem Solving 3(3,0)** Fundamentals and application of formal problem solving, critical thinking and ethics. *Preq:* C S M 100, Construction Science and Management major, or consent of department chair.
- C S M 201 Structures I 3(3,0)** Study of statically determinate structural components and systems, including force applications and distributions in structural elements and the resulting stress-strain patterns in axial, shear, and bearing mechanisms. *Preq:* MTHSC 102 or 106, PHYS 207; Construction Science and Management or Architecture major, or consent of department chair.
- C S M 202 Structures II 4(3,2)** Study of force distribution and behavior in statically determinate structural components and systems; analysis and design of basic reinforced concrete, steel, wood, and formwork components and systems, including shear and moment stress, combined loading/stress conditions, and deflections. *Preq:* C S M 201, Construction Science and Management or Architecture major, or consent of department chair.
- C S M 203 Materials and Methods of Construction I 3(3,0)** Descriptive study of the materials and methods of construction, focusing on nomenclature, building materials, and assembly of building systems consisting primarily of wood, masonry, residential interior and exterior finishes, and building foundations. *Preq:* Construction Science and Management or Architecture major, or consent of department chair. *Preq or Coreq:* A A H 210, C S M 100 (Construction Science and Management majors).
- C S M 204 Contract Documents 3(2,3)** Introduction to working drawings, specifications, and the various documents required to carry out a typical construction project. *Preq:* Construction Science and Management major, or consent of department chair. *Coreq:* C S M 205.
- C S M 205 Materials and Methods of Construction II 3(3,0)** Descriptive study of materials and methods of construction, focusing on nomenclature, building materials, and assembly of building systems consisting primarily of steel and concrete, in addition to roofing assemblies and interior and exterior commercial finishes. *Preq:* C S M 203, Construction Science and Management or Architecture major, or consent of department chair.
- C S M 303 Soils and Foundations 3(2,3)** Study of various types of soils and foundations, including soil testing, reports, compaction, stability, and function, as they relate to the construction process. *Preq:* C S M 202, Construction Science and Management major, or consent of department chair.
- C S M 304 Environmental Systems I 3(3,0)** Theory and practice of heating, ventilating, air conditioning, and plumbing systems for buildings. *Preq:* C S M 205, PHYS 208, Construction Science and Management or Architecture major, or consent of department chair.
- C S M 305 Environmental Systems II 3(3,0)** Theory and practice of fire protection, specialty piping, lighting, and electrical systems for buildings. *Preq:* C S M 304, Construction Science and Management or Architecture major, or consent of department chair.
- C S M 351 Construction Estimating 3(2,2)** Study of basic estimating as applied to construction projects. Includes the take-off of material quantities, assigning labor and equipment production rates, and applying material prices, wage rates, and equipment costs to derive a total job cost. *Preq:* C S M 204, 205, CP SC 120, all required MTHSC courses, Construction Science and Management major, or consent of department chair. *Preq or Coreq:* B E 222, C S M 303.
- C S M 352 Construction Scheduling 3(2,2)** Analysis of construction projects emphasizing estimating, scheduling, and resource leveling. *Preq:* C S M 304 (or concurrent enrollment), 351, Construction Science and Management major, or consent of department chair. *Coreq:* C S M 353.
- C S M 353 Construction Estimating II 3(2,2)** Continuation of basic construction estimating with the additional component of computerized estimating. Includes material, labor, and equipment costs, production rates, bid ethics, constructability analysis, and understanding of other types of estimating procedures. *Preq:* C S M 304 (or concurrent enrollment), 351, Construction Science and Management major, or consent of department chair. *Coreq:* C S M 352.
- C S M 411 Safety in Building Construction 3(3,0)** Study of construction safety management and controls. *Preq:* Construction Science and Management major or consent of department chair. *Coreq:* C S M 453.
- C S M 420 Highway Construction and Contracting 3(3,0)** Study of contracting and construction of highways, including selection and use of equipment, construction of pavements, bridges, and drainage structures, and related processes. *Preq:* C S M 303, 352, 353.
- C S M 450 Construction Internship 1(1,0)** Documentation of 800 hours of approved experience in the construction industry with evaluation of student portfolio and preparation and sitting for the American Institute of Constructors CPC Level I examination. *Preq:* C S M 250 or consent of department chair.
- C S M 453 Construction Project Management 3(3,0)** Study of construction business organization, methods of project delivery, field organization, policy, ethics, project management, control systems, labor management relations, and productivity. *Preq:* C S M 352, 353, LAW 322 (or concurrent enrollment), MGT 307 (or concurrent enrollment), Construction Science and Management major, or consent of department chair. *Coreq:* C S M 411, 461.
- C S M 454 Construction Capstone 6(3,12)** Students develop a capstone project that entails the knowledge obtained in all previous courses in the Construction Science and Management Program. Students must take the capstone course at Clemson University. *Preq:* C S M 453, Construction Science and Management major, or consent of department chair.
- C S M 455, 655 Reducing Adversarial Relations in Construction 3(3,0)** Focuses on the study of the delivery of projects and how adversarial relations can affect the successful completion of the venture. Topics include management of human resources, understanding the needs and processes of the participants, where problems lie, methods of avoiding and settling disputes. *Preq:* Construction Science and Management or Architecture major, senior standing, or consent of department chair.
- C S M 461 Construction Economics Seminar 3(3,0)** Studies in the financial performance of construction companies. *Preq:* ACCT 201, ECON 211, 212, Construction Science and Management major, or consent of department chair. *Coreq:* C S M 453.
- C S M 490, H490 Directed Studies 1-3(1-3,0)** Comprehensive studies and research of special topics not covered in other courses. Emphasizes field studies, research activities, and current developments in construction science. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.
- C S M 498 Current Topics in Construction 1-3(1-3,0)** Study of current topics in the construction industry not central to other construction science courses. Specific titles and course descriptions are announced for each semester. May be repeated for a maximum of six credits. *Preq:* Consent of advisor.

CROP AND SOIL ENVIRONMENTAL SCIENCE

Professors: H. T. Knap, V. L. Quisenberry, E. R. Shipe; *Associate Professor:* W. C. Stringer; *Assistant Professors:* Y. Arai, N. Tharayil; *Lecturer:* B. E. Edge

- CSENV 100 Introduction to Crop and Soil Environmental Science 1(1,0)** Introduction to and survey of the agronomic and soil sciences and their application to current societal issues: career guidance, opportunities for professional certification, and discussion of skills used by agronomists and soil scientists. Offered fall semester only.
- CSENV 202 Soils 4(3,2)** Introduces world land resources, soil formation, classification, and mineralogy. Emphasizes basic chemical and physical properties of soil. Also discusses soil microorganisms, plant nutrients, and fertilization. Soil properties are related to growth. *Preq:* CH 101, 102, or a geology sequence including GEOL 101; or consent of instructor.
- CSENV 350 Practicum 1-6** Preplanned practical or research experience related to student-selected Soils and Sustainable Crop Systems concentration. Practicum is undertaken with an approved advisor or agency. May be repeated for a maximum of six credits. *Preq:* Soils and Sustainable Crop Systems major or consent of department chair.
- CSENV 403, 603 Soil Genesis and Classification 2(1,3)** Study of soil morphology and characterization, pedogenic processes, soil-forming factors, and classification of soils. Offered fall semester only. *Preq:* CSENV 202 or consent of instructor.
- CSENV 404, 604 Soils and Land Use 2(1,3)** Soils interpretations for nonagricultural purposes and facilities. Emphasizes use of modern soil surveys and properties and features of soils important in nonfarm land uses. Not open to Crop and Soil Environmental Science minors or to students who have taken CSENV 202. Offered fall semester only.

CSENV 405, 605 Plant Breeding 3(2,2) Application of genetic principles to the development of improved crop plants. Principal topics include the genetic and cytogenetic basis of plant breeding, mode of reproduction, techniques in selfing and crossing, methods of breeding, inheritance in the major crops, and biometrical methods. Offered spring semester only. *Preq:* GEN 302 or equivalent.

CSENV 406 Special Problems 1-3(0,3-9) Acquaints students with the scientific method. Literature investigation, planning, and execution of an experiment are integral parts of the course. Not open to AGRIC H491 and H492 students. May be repeated for a maximum of six credits. *Preq:* Senior standing, minor in Crop and Soil Environmental Science, and consent of department chair.

CSENV (B E) 408, 608 Land Treatment of Wastewater and Sludges 3(3,0) Principles for designing environmentally acceptable land application systems using municipal and industrial wastewater and sludges are presented. Topics include land-limiting constituent analysis; soil-plant interactions; system equipment and design; system operation and management; public acceptance, social, and regulatory issues. Case studies and field trips are planned. *Preq:* Senior standing in agriculture or engineering or consent of instructor.

CSENV 409, 609 Biology of Invasive Plants 3(3,0) Introductory course covering mechanisms of plant invasions. Emphasizes unique traits that confer invasiveness and/or weediness to plants, and how these plant traits interact with the environment to facilitate invasion of agricultural lands, forests, rangelands and less-managed landscapes. Covers various cultural, chemical and biological control aspects. *Preq:* BIOL 104/106, or BIOSC 304, or consent of instructor.

CSENV 421, 621 Principles of Field Crop Production 3(3,0) Principles for production of field crops. Topics include botany and physiology, tillage, harvesting, storage, and crop quality. Principles are illustrated using examples from various crops. *Preq:* AGRIC 104 or equivalent introductory plant science, CSENV 202.

CSENV 422, 622 Major World Crops 3(3,0) Examines the distribution, adaptation, production, and utilization of major agronomic crops of the world. Emphasizes crops important to U.S. agriculture. Specific crops discussed in more detail include corn, wheat, rice, sorghum, soybeans, cotton, tobacco, and peanuts. *Preq:* AGRIC 104 or equivalent introductory plant science, CSENV 202.

CSENV 423, H423, 623 Field Crops—Forages 3(3,0) Establishment, management, and utilization of forage crops in a forage-livestock agroecosystem context. Discusses hay, silage, and pasture utilization. Uses computer models to study complexity of forage-livestock production systems. *Preq:* AGRIC 104, CSENV 202, or consent of instructor.

CSENV 424, 624 Applied Aspects of Forage Management 1(0,2) Hands-on exposure to forage plantings, establishment and management practices. Includes pasture and harvested forage systems, equipment and practices and analyzes forage-livestock systems. *Preq:* CSENV 423 (or concurrent enrollment).

CSENV 425, 625 Seed Science and Technology 3(2,2) Topics include seed development, germination, dormancy, pathology, storage, and deterioration. Also covers seed testing and commercial production of seed. Emphasizes useful applications of current seed science knowledge. *Preq:* AGRIC 104, BIOSC 205.

CSENV (AP EC) 426, 626 Cropping Systems Analysis 3(2,2) Application of agronomic and economic principles in solving problems related to the production and marketing of agronomic crops. Major part of the course is a case study in which detailed analysis of a farm, agribusiness, or environmental situation is made with students making formal written and oral presentations of results. *Preq:* AP EC 202, AGRIC 104, Junior standing.

CSENV (HORT) 433, 633 Landscape and Turf Weed Management 3(2,2) See HORT 433.

CSENV 446, 646 Soil Management 3(3,0) Basic soil properties are related to compaction, water and solute movement, and root growth. Considers practical management problems and develops solutions based on basic soil characteristics. Problems include erosion, no-tillage, compaction, irrigation, leaching, waste application, golf green management, and orchard establishment. *Preq:* CSENV 202.

CSENV 452, 652 Soil Fertility and Management 3(3,0) Study of soil properties, climatic factors, and management systems in relation to soil fertility maintenance for crop production. Considers plant nutrition and growth in relation to crop fertilization and management. *Preq:* CSENV 202 or consent of instructor.

CSENV 453, H453, 653 Soil Fertility Laboratory 1(0,3) Evaluation and interpretation of soil fertility production. *Preq:* CSENV 202 or consent of instructor.

CSENV 455 Seminar 1(1,0) Students present current agronomic topics of special interest in crop production appearing in recent scientific journals and other publications.

CSENV 475, H475, 675 Soil Physics and Chemistry 3(2,3) Study of the principles of soil physics and chemistry and their applications. Topics include soil texture, structure, compaction, water relations, solute movement, mineral composition, adsorption phenomenon, and soil acidity. *Preq:* CSENV 202, CH 101, PHYS 207.

CSENV (ENTOX, GEOL) 485, 685 Environmental Soil Chemistry 3(3,0) Study of soil chemical processes (sorption, desorption, ion exchange, precipitation, dissolution, and redox reactions) of nutrients and inorganic and organic contaminants in soils and organic matter. Chemical complex equilibria and adsorption phenomena at the solid (soil, sediment, and mineral) water interface are emphasized. *Preq:* CSENV 202, CH 102 or consent of instructor.

CSENV 490, 690 Beneficial Soil Organisms in Plant Growth 3(3,0) Aspects of biological nitrogen fixation, mycorrhizal fungi, microbial-pesticide interactions, bioremediation, nutrient cycles, and biological pest control related to plant growth, soil/environmental quality; and sustainable agriculture are covered. Students who desire laboratory experience in these topics may register for CSENV 406 after consultation with instructor. *Preq:* CSENV 202, MICRO 305, PL PA 310, or consent of instructor.

DANCE

Lecturer: C. L. Hosler

DANCE 130 Tap Dance I 1(0,3) Introduces fundamentals and vocabulary of tap dancing with opportunities to develop rhythmic patterns of various origins. May be repeated for a maximum of eight credits, with a maximum of 16 credits of dance applied toward a degree. Applied dance fee is assessed.

DANCE 140 Jazz Dance I 1(0,3) Introduces basic principles and fundamentals of jazz technique and explores flexibility and strength-building exercises. May be repeated for a maximum of eight credits, with a maximum of 16 credits of dance applied toward a degree. Applied dance fee is assessed.

DANCE 150 Modern Dance I 1(0,3) Introduces basic principles of dance movement and vocabulary, and actively explores and applies different methods of body alignment and theory. May be repeated for a maximum of eight credits, with a maximum of 16 credits of dance applied toward a degree. Applied dance fee is assessed.

DANCE 160 Ballet Dance I 1(0,3) Introduces basic principles and fundamentals of classical ballet, with emphasis on good technique, center work, and across the floor work. May be repeated for a maximum of eight credits, with a maximum of 16 credits of dance applied toward a degree. Applied dance fee is assessed.

DANCE 330 University Dance Company 1(0,3) Performance ensemble for advanced dance students. Provides opportunities to learn and develop choreographic skills as well as to improve personal dance techniques. Company is selected by audition. May include public recital(s). May be repeated for a maximum of eight credits. Applied dance fee is assessed. *Preq:* Consent of instructor.

DESIGN STUDIES

Professors: D. J. Allison, J. F. Barker, *President*; J. R. Caban, E. T. Cavanagh, *Chair*; L. G. Craig, R. J. Hogan, Y. Kishimoto, R. J. Miller (*Charleston*), R. B. Norman, S. F. Verderber; *Associate Professors:* D. G. Battisto, J. A. Erdman, K. E. Green, H. C. Harritos, N. J. Hurt, R. T. Silance; *Assistant Professors:* D. A. Hecker, U. Heine, R. T. Huff (*Charleston*), R. L. Rael, V. M. San Fratello, M. L. Skinner; *Lecturers:* R. A. Bruhns, P. A. Hedegor (*Charleston*), A. H. Jacques, A. K. Jennings (*Charleston*), P. L. Laurence, D. M. Lee, M. T. Maher (*Charleston*), C. B. Mills, G. A. Nicholson (*Charleston*), D. A. Pastre (*Charleston*), S. A. Warren (*Charleston*)

DSIGN 321 Wood Shop Practices, Materials, Tools, and Equipment 3(1,6) Instruction in the use of a full range of shop machinery, tools, equipment, and craftsmanship, as well as an orientation to a wide variety of materials, techniques, and procedures. The paramount importance of safety is continually emphasized. *Preq:* Consent of instructor.

DSIGN 370 Design Principles 6(1,10) Students develop graphic skills, including plans, sections, elevations, axonometric and perspective drawings, and develop creative problem solving skills incorporating precedent studies, contextual analysis, concept development, modeling and presentation skills. Course is offered only during the summer at study abroad locations. *Preq:* ARCH 101 or consent of instructor. *Coreq:* ARCH 471 and 472.

EARLY CHILDHOOD EDUCATION

Professors: V. I. Correa, D. A. Stegelin; *Assistant Professor:* A. L. Eckhoff; *Clinical Faculty:* R. S. N. Wilson

ED EC 220 Family, School, and Community Relationships 3(3,0) Historical trends, theoretical models, and strategies of effective family/school/community relationships are examined. Special emphasis is placed on multicultural issues and on programs that support collaborative interaction with families that benefit children. *Preq:* Sophomore standing.

ED EC 300 Foundations of Early Childhood Education 3(3,0) Philosophical and historical foundations of early childhood education, societal changes and influences, needs of young children and families, program differentiation, and future trends are examined through coursework and experiential activities. *Preq:* General Education requirements; ED EC 220, ED F 334, or consent of instructor.

ED EC 336, H336 Social Development of Infants and Young Children 3(3,0) Study of the behavior of the preschool child from infancy through age five. Theoretical concepts and observation of children's behavior are integrated, analyzed, and evaluated to discover implications for teaching and guiding preschool children. Includes a minimum of 10 one-hour observation-participation visits in public kindergarten. *Preq:* ED F 334, minimum grade-point ratio of 2.0 or consent of instructor.

ED EC 400 Observation and Assessment in Clinical Settings 3(3,0) Clinical experiences in early childhood settings prior to student teaching provide opportunities for observing, guiding, and assessing young children, birth to age eight, in a variety of high quality preschool and primary settings. Practicum spans the entire semester. To be taken Pass/Fail only. *Preq:* ED EC 336; concurrent enrollment in ED EC 420, 430, 440, 450, and READ 459.

ED EC 420 Early Childhood Science 3(3,0) Students develop knowledge, skills, and attitudes needed to foster science education among young children. Emphasizes teaching strategies and techniques appropriate for young children (birth to age eight), understanding the unique learning needs of special populations, and integrating science across the curriculum. *Preq:* General Education requirements. *Coreq:* ED EC 400, 430, 450, READ 459.

ED EC 430 Early Childhood Mathematics 3(3,0) Examination of theories and methods of teaching mathematics in terms of how young children develop mathematical thinking. Topics include problem solving, current issues, diversity, current technologies, reflective teaching, and applications of math in everyday life. *Preq:* General Education mathematics requirement; admission to the professional level. *Coreq:* ED EC 400, 420, READ 459.

ED EC 440 Integrated Language Arts and Social Studies in Primary Schools 3(3,0) Integrates social studies and language arts in a course that reflects recommended teaching practices for young children (birth to age eight). Uses language arts as an approach for teaching social studies content, techniques, and methods in primary schools. *Preq:* Admission to the professional level. *Coreq:* ED EC 400, 420, 430, READ 459.

ED EC 450 Early Childhood Curriculum 3(3,0) Constructivist approach is used to explore children's thinking as it influences curriculum design in early childhood. Analyzes the educational needs of the young child in the cognitive realm and examines the implementation of activities, experiences, and play-based program models. *Preq:* Admission to the professional level. *Coreq:* ED EC 400, 420, READ 459.

ED EC 484 Directed Teaching in Early Childhood Education 12(1,33) Supervised observation and teaching experiences in cooperation with nursery schools, kindergartens, and early elementary schools. Restricted to seniors or graduates who have completed prerequisite courses and have the cumulative grade-point ratio for graduation. *Preq:* ED EC 400, 450, ED EL 321, 488, READ 459; admission to the professional level; consent of area committee chair.

EAST ASIAN STUDIES

EAS 123 Introduction to China 3(3,0) Introduction to various aspects of Chinese civilization, including geography, ethnic groups, language, history, philosophy, religion, literature, arts, architecture, and social customs. All readings and discussions are in English.

ECONOMICS

Professors: D. K. Benjamin, H. Bodenhorn, W. R. Dougan, T. A. Mroz, R. D. Sauer Jr., *Chair*; C. J. Simon, R. F. Tamura, R. D. Tollison, J. T. Warner, P. W. Wilson; *Associate Professors:* S. L. Baier, D. B. Gordon, M. J. Jerzmanowski, C. M. Kirby; *Assistant Professors:* T. Cvrcek, D. Miller, S. Mityakov, T. K. Schoellman, C. J. Thomas, K. K. Tsui, P. Warren, D. Wood, L. Zhang

ECON 200 Economic Concepts 3(3,0) One-semester survey of basic economic concepts that offers an overview of both microeconomics and macroeconomics. Not intended for business majors or other students seeking a comprehensive introduction to economic analysis and its applications. Credit will not be given to students who have received credit for ECON 211 or 212.

ECON 211, H211 Principles of Microeconomics 3(3,0) Introduction to economic reasoning and its application to the study of the behavior of consumers and business firms. Particular topics include competition, monopoly, international trade, and the impact of selected public policies. Intended as the first of a two-semester sequence in the foundations of economics.

ECON 212, H212 Principles of Macroeconomics 3(3,0) Continuation of ECON 211 in which fundamental economic principles are applied to the study of aggregate economic performance. Topics include the forces determining the rates of inflation, unemployment, and economic growth, with particular emphasis on the influence of fiscal and monetary policies through financial markets. *Preq:* ECON 211 or consent of instructor.

ECON 301 Economics of Labor 3(3,0) Introduces students to the economics of the labor market and labor relations. Considers the theories of wages and employment, determination, unemployment, investment in human capital, discrimination, and public policy toward the labor market. Also considers the role of labor unions. May not be used to satisfy requirements for a degree in Economics. *Preq:* ECON 211 or consent of instructor.

ECON 302 Money and Banking 3(3,0) Considers the function of money and banking in both the product and financial markets. Special emphasis is placed on monetary theory and current problems of monetary policy. May not be used to satisfy requirements for a degree in Economics. *Preq:* ECON 212 or consent of instructor.

ECON 303 Economics and Sports 3(3,0) Economic analysis of sports teams, leagues, and institutions. Analyzes basic economic issues using sports data. May not be used to satisfy requirements for a degree in Economics. Credit will not be given to students who have completed ECON 426. *Preq:* Sophomore standing, ECON 211.

ECON (MGT) 306 Managerial Economics 3(3,0) Uses tools of economic analysis in classifying problems in organizing and evaluating information, and in comparing alternative courses of action. Bridges the gap between economic theory and managerial practices. May not be used to satisfy requirements for a degree in Economics. *Preq:* ECON 211 or consent of instructor.

ECON 307 Arbitration 3(3,0) Analyzes dispute settlement procedures emphasizing mediation, fact-finding, and arbitration as they are used to resolve labor-management disputes in the public and private sectors. *Preq:* Consent of instructor.

ECON 309 Government and Business 3(3,0) Relationships between government and business, including, among other topics, government efforts to enforce competition; to regulate public utilities; and to protect the special interest of laborers, farmers, and consumers. May not be used to satisfy requirements for a degree in Economics. *Preq:* ECON 211 or consent of instructor.

ECON 310 International Economy 3(3,0) Studies of the process of international commerce. Covers basic theory of trade and exchange rates, institutional and legal environment, current policy issues. Not open to students who have taken ECON 412. May not be used to satisfy requirements for a degree in Economics. *Preq:* ECON 211 and 212 or consent of instructor.

ECON 314, H314 Intermediate Microeconomics 3(3,0) Analytical study of basic concepts of value and distribution under alternative market conditions. *Preq:* ECON 211 or consent of instructor.

ECON 315, H315 Intermediate Macroeconomics 3(3,0) Macroeconomic problems of inflation and unemployment are focal points. Includes statistics (measures of real output and the price level) and theory (covering the sources of short-run fluctuations and long-run growth). Analyzes appropriate public policies addressing these issues. *Preq:* ECON 212 or consent of instructor.

ECON 319 Environmental Economics 3(3,0) Study of the application of economic logic to issues surrounding environmental management and policy. Examines individual, firm, and collective decision making as well as the evolution of regulatory approaches for controlling environmental use. *Preq:* ECON 314.

ECON (E L E) 321 Economics of Innovation 3(3,0) Examines the nature of entrepreneurship and the contribution of innovation to economic growth. Investigates the organizational and institutional sources of innovation in different firms and different countries as well as the work of economic theorists concerning the role entrepreneurs play in bringing new products to market. *Preq:* ECON 306 or 314.

ECON 325 Personnel Economics 3(3,0) Study of various compensation and personnel practices firms employ. Explains when each of those practices should be followed to elicit the desired employee effort and labor force quality. Topics include piece-rate and time-rate systems, seniority-based incentive schemes, promotion contests, evaluation systems, mandatory retirement, and up-or-out rules. *Preq:* ECON 211 or consent of instructor.

ECON 340 Behavioral Economics 3(3,0) Introduces the economic, sociological, and psychological aspects of decision making under uncertainty. Presents the psychology of prediction, intuitive prediction: biases and corrective procedures. Topics also include framing, choice with costly information, and social influences on individual behavior. *Preq:* ECON 211 or consent of instructor.

ECON 344 Economics of Institutions and Property Rights 3(3,0) Study of fundamental property rights structures and institutions in the capitalist economy and the arrangements that create incentives to produce and exchange. *Preq:* ECON 211 and 212.

ECON 350, H350 Moral and Ethical Aspects of a Market Economy 3(3,0) Can a market system produce results that are fundamentally just? Is justice possible without voluntary exchange? Applies both economic and philosophical analyses to these questions. Emphasizes the causes, consequences, and morality of the distribution of wealth and income in a free-market system. *Preq:* ECON 314 or consent of instructor.

ECON 360 Public Choice 3(3,0) Covers the economic approach to political activities and institutions. Topics include voting, voting rules, constitutions, political competition, political business cycles, vote trading, interest groups, bureaucracy, committees, legislators, executives, and judges. Designed for Economics and non-Economics majors and requires only basic skills in microeconomics. *Preq:* ECON 211 or consent of instructor.

ECON H390 Junior Honors Research 1(1,0) Readings and research in conjunction with an approved economics course at the 300 or 400 level. Honors status required. May be repeated for a maximum of three credits.

ECON 397 Creative Inquiry—Economics I 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of four credits.

ECON 401 Labor Market Analysis 3(3,0) Develops the methods of economic analysis of labor markets. Requires students to apply these methods to problems of the labor market. Topics include labor demand and supply, human capital, occupational choice, compensating wage differentials, organizational wage structures and incentive systems, unemployment, and discrimination. *Preq:* ECON 314.

ECON 402 Law and Economics 3(3,0) Application of economics to the law of property, torts, and contracts; regulation of markets, business organizations, and financial transactions; distribution of income and wealth; and criminal law. *Preq:* ECON 211 or consent of instructor.

ECON 404 Comparative Economic Systems 3(3,0) Comparative analytical and historical study of the principal economic systems which have been important in the modern world including, among others, capitalism and socialism. *Preq:* ECON 314 or consent of instructor.

ECON 405, 605 Introduction to Econometrics 4(3,3) Introduction to methods of quantitative analysis of economic data. Reviews basic statistical methods and probability distribution. Topics include data management using professional statistical software applications; multiple regression analysis; hypothesis testing under conditions of multicollinearity, heteroscedasticity, and serial correlation. *Preq:* ECON 211 and 212; MTHSC 108 or 207; EX ST 301 or MTHSC 301 or 309.

ECON 406, 606 Advanced Econometrics 3(3,0) Reviews statistical inference using multiple regression (OLS) analysis and model specification. Topics include multicollinearity, heteroscedasticity, and serial correlation; two-staged least squares and instrumental variables models; simultaneous equations models; limited dependent variable models using maximum likelihood estimation and time-series analysis; and presentation of results in technical writing. *Preq:* ECON 405 or consent of instructor.

ECON 410, 610 Economic Development 3(3,0) Consideration and analysis of economic and related problems of underdeveloped countries. Attention is given to national and international programs designed to accelerate solution of these problems. *Preq:* ECON 314 or consent of instructor.

ECON 411, 611 Economics of Education 3(3,0) Analysis of economic issues related to education. The decision to invest in education, elementary and secondary school markets and reform, the market for college education, teacher labor markets, and education's effects on economic growth and income distribution. *Preq:* ECON 314 or consent of instructor.

ECON 412, 612 International Microeconomics 3(3,0) Analysis of the essential aspects of international economic linkages. Discusses gains and redistributive effects of trade and the barriers to trade within the context of a variety of economic models. Also discusses the history of trade policy and the political economy of its determination. *Preq:* ECON 314 or consent of instructor.

ECON 413, 613 International Macroeconomics 3(3,0) Examination of macroeconomic linkages between an individual country and the rest of the world and how these linkages are affected by the choice of exchange rate regimes. Topics include the relation between domestic and foreign interest rates and exchange rates and the ability to pursue independent monetary policies. *Preq:* ECON 315.

ECON 419 Economics of Defense 3(3,0) Examines the American defense establishment in terms of resources utilized, alternative uses, and the contribution to the national economy and scientific progress generated by resources in a defense use. Discusses economic problems inherent in shifting resources between defense and nondefense uses and among alternative defense uses. *Preq:* ECON 314.

ECON 420 Public Sector Economics 3(3,0) Study of the role of government and its proper functions and limitations in a market. Provision of goods and services by all levels of government and instruments of taxation are evaluated according to efficiency and equity criteria. Contemporary public sector issues are emphasized throughout. *Preq:* ECON 314 or consent of instructor.

ECON 422 Monetary Economics 3(3,0) Intensive study of the role of monetary factors in economic change. Modern monetary theories and their empirical relevance for policy are developed against a background of monetary history and institutions. *Preq:* ECON 314 and 315 or consent of instructor.

ECON 423 Economics of Health 3(3,0) Applies microeconomic theory to examine the demand for health services and medical care, the market for medical insurance, the behavior of physicians and hospitals, and the role of government in health-care provision and regulation. *Preq:* ECON 314.

ECON 424, 624 Organization of Industries 3(3,0) Empirical, historical, and theoretical analyses of market structure and concentration in American industry: the effects of oligopoly, monopoly, and cartelization upon price, output, and other policies of the firm; antitrust and other public policies and problems are studied. *Preq:* ECON 314 or consent of instructor.

ECON 425, 625 Antitrust Economics 3(3,0) Analysis of the economic and legal issues created by the exercise of market power. The motivation and execution of government policy towards mergers, predatory conduct, and various restraints of trade are intensively examined. *Preq:* ECON 309 or 314 or consent of instructor.

ECON 426, H426, 626 Seminar in Sports Economics 3(3,0) Economic analysis of sports teams, leagues, and institutions. Topics include antitrust issues, public funding of sports venues, labor relations, wagering markets, athlete compensation, and application of economic principles to sports settings. Empirical research project is cornerstone of course. *Preq:* ECON 314, 405; or consent of instructor.

ECON 427, 627 Development of the American Economy 3(3,0) Explores several topics relevant to understanding the American experience. Considers the institutions and developments critical to America's ascendancy from a small country to a dominant global economic power. Investigates immigration, innovation, education, finance, and the changing role of race and gender in the economy. *Preq:* ECON 314, 315.

ECON 428, 628 Cost-Benefit Analysis 3(3,0)

Develops techniques for the appraisal of public expenditure programs with particular emphasis on investment in infrastructure. Topics include choice of an appropriate discount rate and the calculation of social costs and benefits in the presence of market distortions. *Preq:* ECON 314 or consent of instructor.

ECON 430 Topics in Mathematical Economics 3(3,0)

Skills acquired in freshman mathematics are applied to selected topics in economic theory. Course is a good complement to ECON 314 and provides excellent preparation for 400-level courses in economics, especially ECON 405. May be taken concurrently with ECON 314. *Preq:* ECON 314, and MTHSC 108 or 207.

ECON 435 Family Economics 3(3,0)

Analysis of economic aspects of the family. Economics of marriage, divorce, fertility, public policies affecting the family, women's labor force participation, and the gender gap are studied using main economic theories and empirical studies. *Preq:* ECON 314 or consent of instructor.

ECON 440, 640 Game Theory 3(3,0)

Introduction to the formal analysis of strategic interaction among rational, self-interested rivals. Basic theoretical aspects of games are discussed and applied to such topics as bargaining, voting, auctions, and oligopoly. *Preq:* ECON 314 and MTHSC 106, or ECON 430, or consent of instructor.

ECON 455, 655 Applied Microeconomic Research 3(3,0)

Students conduct research in applied microeconomics. Topics vary according to student and professor interests. Students read papers in the literature, formulate their own economic hypotheses, and collect and analyze data to test those hypotheses. May be repeated for a maximum of nine credits, but only if different topics are covered. *Preq:* ECON 314 or consent of instructor.

ECON H491 Senior Honors Thesis Research 3(3,0)

Reading and research for the Senior Honors Thesis. *Preq:* ECON 314, 315, senior honors standing.

ECON H492 Senior Honors Thesis Writing 3(3,0)

Writing and oral presentation of the Senior Honors Thesis. *Preq:* ECON H491.

ECON 496 Independent Study 1-3(1-3,0)

Research and writing on a selected economics topic chosen by the student. A written proposal must be approved by the instructor prior to the start of the semester. May be repeated for a maximum of six credits. *Preq:* ECON 314.

ECON 497 Creative Inquiry—Economics II 1-3(1-3,0)

Engages students in research projects selected by the Economics Department faculty. Research projects vary depending on faculty and student interest. May be repeated for a maximum of six credits. *Preq:* ECON 314 or consent of instructor.

ECON 498, H498 Selected Topics in Economics 3(3,0)

In-depth treatment of topics not covered fully in regular courses. Topics vary from year to year. May be repeated for a maximum of nine credits, but only if different topics are covered. *Preq:* ECON 314 and 315 or consent of instructor.

ECON 499 Senior Seminar in Economics 1-3(1-3,0)

Discussion of topics of current interest in economics. Students conduct directed research on a particular topic. *Preq:* Consent of instructor.

EDUCATION

Professor: W. R. Fisk, *Chair, Lecturer:* H. W. Millar

ED 105 Orientation to Education 2(2,1)

Introduction to teaching addresses basic program requirements, SoE Conceptual Framework, state evaluation system, the nature of the diverse and multicultural classroom, standards and practices of professional conduct and requirements in teaching. A field experience involving tutoring in a P-12 classroom is required.

ED 110 Introduction to Tutoring 1(1,0)

Students develop and reinforce skills in tutoring and communication through use of techniques based in educational research. To be taken Pass/Fail only.

ED 111 Introduction to Supplemental Instruction 1(1,0)

Students develop and reinforce interpersonal relationship skills in listening, decision making, communicating, group dynamics, leadership, assertiveness, time management, problem solving, and conflict resolution. To be taken Pass/Fail only.

ED 190 Leadership, Citizenship, and Community Service 3(3,0)

Provides active learning opportunities for students to understand better the system of government, learn the mechanics of how leadership can influence education and other initiatives, and develop interpersonal skills that will assist them throughout their professional lives. Culminates with a service learning plan for the students' local community.

ED 197 Creative Inquiry—Education 1-4(1-4,0)

In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

ED 297 Creative Inquiry—Education 1-4(1-4,0)

In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

ED 322 Responding to Emergencies 3(2,1)

Provides the citizen responder with the knowledge and skills necessary in a variety of emergencies to help sustain life and to minimize pain and the consequences of injury until professional help arrives. Includes first aid, CPR, and automated external defibrillation (AED).

ED 397 Creative Inquiry—Education 1-4(1-4,0)

In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

ED 405 Multiculturalism 3(3,0)

Introduces prospective teachers to the influence of culture on learning from an anthropological and historical perspective. *Preq:* HIST 172, 173, or consent of instructor.

ED 438 Selected Topics in Education 1-3(1-3,0)

Specific education topics not found in other courses are selected for in-depth study. May be repeated for a maximum of 12 credits, but only if different topics are covered.

ED 439 Independent Study in Education 1-3(1-3,0)

Study of selected topics in education under the direction of a faculty member chosen by the student. Student and faculty member develop a course of study different from any existing courses and designed for the individual student. May be repeated for a maximum of 12 credits, but only if different topics are covered.

ED 441, 641 Middle School Curriculum 3(3,0)

Concepts and methods for teaching middle school students. Discusses nature of middle school students, teacher characteristics, curricular and co-curricular programs, organization, and teaching.

ED 497 Creative Inquiry—Education 1-4(1-4,0)

In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

ED H499 Education Honors Capstone 1-6(1-6,0)

Students seeking departmental honors complete honors research under faculty mentors. Students take a minimum of six hours across at least two semesters. May be repeated for a maximum of 12 credits. *Preq or Coreq:* ED F H301, H302.

EDUCATIONAL COUNSELING**ED C 199 Creative Inquiry—Counselor Education 1-4(1-4,0)**

In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

ED C 234 Introduction to Addictions: Basic Education and Prevention 3(3,0)

Basic review of addictions and chemical dependence. Gives future educators skills in the identification of chemical abuse, techniques for intervention, and methods of prevention education. SOC 396 and 397 are recommended as follow-up courses for those interested in pursuing the topic.

ED C 299 Creative Inquiry—Counselor Education 1-4(1-4,0)

In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

ED C 390 Student Development Theory, Leadership, and Counseling Skills for Student Leaders 3(3,0)

Introduction to theoretical and practical applications of student development and leadership on the university campus. Develops skills assisting students with leadership development, problem solving, conflict resolution, confrontation, and referral. Explores legal and ethical issues for practitioners and effective utilization of resources available on the campus. May be repeated for a maximum of nine credits.

ED C 399 Creative Inquiry—Counselor Education 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

ED C 499 Creative Inquiry—Counselor Education 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

EDUCATIONAL FOUNDATIONS

Professors: D. E. Barrett, W. R. Fisk, *Chair*; R. P. Green Jr., D. M. Switzer; *Associate Professors:* G. C. Delicio, C. L. Peters, C. G. Weatherford; *Assistant Professors:* L. B. Igo, S. N. Rosenblith; *Lecturers:* A. O. Baldwin, R. D. Visser

ED F 301, H301 Principles of American Education 3(3,0) Study of the legal basis, historical development, characteristics, and functions of educational institutions in the United States. *Preq:* ED 105 (or concurrent enrollment), 2.0 minimum grade-point ratio, or consent of instructor.

ED F 302, H302 Educational Psychology 3(3,0) Introduction to classroom use of objectives, motivation theories, learning theories, tests and measurements, classroom management, and knowledge of exceptional learners. *Preq:* ED 105 (or concurrent enrollment), 2.0 minimum grade-point ratio, or consent of instructor.

ED F 308 Classroom Assessment 3(3,0) Introduction to classroom assessment and standardized testing. *Preq:* ED F 302.

ED F (CTE) 315 Technology Skills for Learning 1(0,2) Students develop technology skills, such as creating Web pages and multimedia presentations in the context of general education class requirements. Products developed are linked within the School of Education e-portfolio. *Preq:* Admission to Teacher Education program, ED 105; or consent of instructor.

ED F 320 History of United States Public Education 3(3,0) Historical survey of the development of United States public schools. *Preq:* ED 105 (or concurrent enrollment), 2.0 minimum grade-point ratio, or consent of instructor.

ED F 334, H334 Child Growth and Development 3(3,0) Introduction to lifespan development. Heavy emphasis is placed on the physical, social, emotional, and cognitive characteristics. Includes a minimum of five one-hour observation-participation visits to an elementary school. *Preq:* ED 105 (or concurrent enrollment), 2.0 minimum grade-point ratio, or consent of instructor.

ED F 335, H335 Adolescent Growth and Development 3(3,0) Introduction to lifespan development. Emphasizes the physical, social, emotional, and cognitive characteristics of the 10- to 18-year old and the educational implications of those developmental characteristics. *Preq:* ED 105 (or concurrent enrollment), 2.0 minimum grade-point ratio, or consent of instructor.

ED F 406 Philosophy, Schooling, and Educational Policy 3(3,0) Analysis of the development of contemporary educational theory and its impact on current schooling practices and educational policy development.

ED F 425 Instructional Technology Strategies 1(0,2) Helps future teachers learn to use technology effectively in support of content area instruction. To be taken concurrently with either methods classes or during student teaching as directed by major. *Preq:* ED F (CTE) 315.

ED F (AG ED, CTE) 480, 680 Digital Technology in the 21st Century Classroom 3(2,2) Fundamentals of computer applications for teachers. Develops competencies in general computer applications such as word processing and database management and addresses educational uses of the Internet and computer-assisted instruction, with emphasis on legal and ethical issues and the impact of computer technology upon society. *Preq:* Admission to a Teacher Education Program.

ED F (AG ED, CTE) 482, 682 Advanced Educational Applications of Microcomputers 3(2,2) Provides students with the knowledge and skills needed to apply microcomputer technology to the utilization and generation of educational software in accordance with sound educational principles. *Preq:* ED F (AG ED, CTE) 480.

ED F 490, 690 Student Management and Discipline 3(3,0) Aids pre-service and in-service teacher development and refines knowledge, skills, and values important for managing students in school settings. Emphasizes practical application of theory and research and legal and ethical considerations. *Preq:* ED F 302 or PSYCH 201; ED F 334, 335, or suitable alternative; 2.0 minimum grade-point ratio.

ED F 497, 697 Instructional Media in the Classroom 3(3,0) Integrated approach to the use of audiovisual media stressing systematic planning, selection, utilization, and evaluation as well as production of materials and equipment operation. *Preq:* 2.0 minimum grade-point ratio.

ELECTRICAL AND COMPUTER ENGINEERING

Professors: C. M. Butler, E. R. Collins Jr., D. M. Dawson, A. A. Girgis, J. N. Gowdy, T. H. Hubing, E. B. Makram, D. L. Noneaker, L. W. Pearson, K. F. Poole, M. B. Pursley, R. J. Schalkoff, R. Singh, I. D. Walker, X.-B. Xu; *Associate Professors:* C. W. Baum, M. A. Bridgwood, R. R. Brooks, W. R. Harrell, A. W. Hoover, W. B. Ligon III, A. Q. Martin, H. B. Russell; *Assistant Professors:* S. T. Birchfield, T. C. Burg, R. E. Groff, S. Kim, M. C. Smith, K.-C. Wang, P. Wang, L. Zhu; *Visiting Associate Professors:* S. J. Hubbard, W. J. Reid III

E C E 199 Creative Inquiry—Electrical and Computer Engineering 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

E C E 201, H201 Logic and Computing Devices 2(2,0) Introduction to Boolean algebra and digital logic. Topics include number systems and representation of information; Boolean operators and algebra; expression minimization; combinational circuits, including adders, comparators, decoders and multiplexors; sequential logic, including flip-flops, shift registers, counters and memory. *Preq:* MTHSC 108, PHYS 122.

E C E 202, H202 Electric Circuits I 3(3,0) Study of DC resistive circuits, Kirchhoff's Laws, Nodal and Mesh emphasis, sources, Thevenin's and Norton's theorems, RC, RL, RCL circuit solutions with initial condition using homogenous or nonhomogenous ordinary differential equations having constant coefficients. Develop sinusoidal steady state solution. *Preq:* MTHSC 108, PHYS 122. *Coreq:* E C E 211, PHYS 221.

E C E 204 Circuit Analysis Problems I 1(0,3) Analysis and solution of electrical network problems using mesh and nodal analysis, Thevenin's and Norton's theorems and equivalent circuits and other circuit analysis from E C E 202. *Coreq:* E C E 202.

E C E 209, H209 Logic and Computing Devices Laboratory 1(0,2) Introduction to designing, building, simulating and testing digital logic circuits. Topics include SSI and MSI ICs; general combinational circuits; adders, decoders and multiplexors; general sequential circuits; shift registers, counters and memory. *Preq:* E C E 201 (or concurrent enrollment).

E C E 211 Electrical Engineering Laboratory I 1(0,2) Principles of measurement and instruments used to measure parameters and dynamic variables in electric circuits, steady state and transient measurements in DC and AC circuits, and data analysis methods are included. *Coreq:* E C E 202.

E C E 212 Electrical Engineering Laboratory II 1(0,2) Emphasizes measurement techniques in AC steady-state circuits and comparison to theoretical predictions. Two-port network methodology and transfer functions are studied experimentally and related to analysis using transform techniques. *Preq:* E C E 202, 211. *Coreq:* E C E 262.

E C E 222 Systems Programming Concepts for Computer Engineering 3(3,0) Development of computer systems programming and code reading techniques. Tools, programming languages, libraries, operating systems, and hardware. Code reading is emphasized. Programming projects reinforce course topics. *Preq:* CP SC 111.

E C E 223 Computer Systems Engineering 3(3,0) Analysis of implementation techniques for systems software. Applying engineering principles including code reading to the design of data structures and algorithms for low level computer systems, embedded systems, and hardware/software systems. Includes coverage of address translation, memory management, file systems, and process management. *Preq:* E C E 222.

E C E 262, H262 Electric Circuits II 3(3,0) Continuation of the study of electric circuits, including three-phase circuits, complex frequency and network functions, frequency response, two-port parameters, magnetically-coupled circuits, Laplace transforms, and introduction to Fourier series and transforms. *Preq:* E C E 202, MTHSC 206, PHYS 221. *Coreq:* E C E 212, MTHSC 208.

- E C E 263 Circuit Analysis Problems II 1(0,3)** Analysis of basic AC circuit analysis techniques to analyze the transient and steady-state behavior of both simple and complex circuits. *Coreq:* E C E 262, MTHSC 208.
- E C E 272, H272 Computer Organization 3(3,0)** Introductory course in computer organization and architecture. Topics include CPUs, memory, I/O, processor families, buses, peripherals, microarchitectures, and instruction sets. *Preq:* E C E 201 and CP SC 111.
- E C E 273, H273 Computer Organization Laboratory 1(0,2)** Laboratory enhances students' understanding of computer organization via assignments involving assembly language programming. Topics include basic syntax, branching and loops, addressing modes, arrays and pointers, subroutines and stacks. *Preq:* E C E 272 (or concurrent enrollment).
- E C E 299, H299 Creative Inquiry—Electrical and Computer Engineering 1-4(14,0)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.
- E C E H300 Junior Honors Seminar 1(2,0)** Acquaints students enrolled in the Departmental Honors Program with current research activities in the Department. Faculty provide seminars where research interests are summarized. Seminars are planned to prepare students in choosing research topics for their senior theses.
- E C E 307 Basic Electrical Engineering 2(2,0)** A first course in electrical engineering to provide non-Electrical Engineering majors with a knowledge of DC and AC circuit theory, AC power distribution, and numerous electrical devices, apparatus, and digital systems. *Preq:* MTHSC 206, PHYS 221. *Coreq:* E C E 309.
- E C E 308 Electronics and Electromechanics 2(2,0)** Continuation of E C E 307. Energy conversion systems are considered, as well as basic electronics. *Preq:* E C E 307.
- E C E 309 Electrical Engineering Laboratory I 1(0,2)** Laboratory to accompany E C E 307. Basic electrical circuits and instrumentation. *Coreq:* E C E 307.
- E C E 311 Electrical Engineering Laboratory III 1(0,2)** Measurements and characteristics of electronic devices and circuits; use of manual and automated instruments to acquire data; oral and written engineering reports. *Preq:* E C E 262, MTHSC 208, PHYS 221. *Coreq:* E C E 320.
- E C E 312 Electrical Engineering Laboratory IV 1(0,2)** Design and characterization of functional circuits using solid-state devices; use of manual and automated instruments for measurements; statistical analysis of data; preparation of engineering reports. *Preq:* E C E 311, 320. *Coreq:* E C E 321.
- E C E 317, H317 Random Signal Analysis 3(3,0)** Introduction to engineering problems of a probabilistic nature. Systems transformations, statistical averages, simulation, and estimation of system parameters. *Preq:* E C E 262, MTHSC 208. *Coreq:* E C E 330.
- E C E 320 Electronics I 3(3,0)** Introduction to electronic materials and devices; principles of design; design of DC and AC circuits using diodes, bipolar junction transistors, field-effect transistors and use of transistors in digital circuits. *Preq:* E C E 262, MTHSC 208, PHYS 221. *Coreq:* E C E 311.
- E C E 321 Electronics II 3(3,0)** Analysis and design of discrete amplifier circuits at low and high frequencies; operational amplifiers, distortion in amplifiers, oscillator design, and circuit analysis of active digital devices. *Preq:* E C E 320. *Coreq:* E C E 312.
- E C E (CP SC) 322 Introduction to Operating Systems 3(3,0)** See CP SC 322.
- E C E 327 Digital Computer Design 3(3,0)** Design of high-speed ALUs, control and timing circuitry, memory systems and I/O circuitry; microprogrammed computer design using bit-slice microprocessors; current hardware topics related to computer design; hands-on design experience; and use of logic analyzer for system debugging. *Preq:* E C E 371.
- E C E 329 Computer Systems Structures 3(3,0)** Fundamental structures and issues that arise in the analysis and implementation of computer systems. Topics include operating systems structures and data structures and their relationship to computer organization. Engineering science background for computer systems design. *Preq:* E C E 223, 272.
- E C E 330, H330 Signals, Systems, and Transforms 3(3,0)** Study of systems models, analysis of signals, Fourier series and transforms, sampling and Z transforms, discrete Fourier transforms. *Preq:* E C E 262, MTHSC 208.
- E C E (CP SC) 352 Programming Systems 3(3,0)** Second course in programming languages and systems. Topics include assemblers, compilers, and syntactical methods; string manipulation and list processing; concepts of executive programs and operating systems; introduction to time-sharing systems. *Preq:* E C E 223; or CP SC 212 and 215. *Coreq:* MTHSC 119 or 419.
- E C E 360 Electric Power Engineering 3(3,0)** Presents the basic principles of electromagnetic induction and electromagnetic forces developed. Topics include synchronous machines, power transformers, electric power transmission, and distribution systems, DC motors, and induction motors. *Preq:* E C E 262, PHYS 221.
- E C E 371 Microcontroller Interfacing 3(3,0)** Discusses the programming and interfacing of microcontrollers in order to control their integrated devices and external peripherals. Topics include memory and I/O; interrupts, counters and timers; ADCs and DACs; PWMs; and parallel and serial communication. *Preq:* E C E 262, 272. *Coreq:* E C E 320.
- E C E 372, Microcontroller Interfacing Laboratory 1(0,3)** Discusses the programming and interfacing of microcontrollers in order to control their integrated devices and external peripherals. Topics include memory and I/O; interrupts, counters and timers; ADCs and DACs; PWMs; and parallel and serial communication. *Preq:* E C E 371 (or concurrent enrollment).
- E C E 380 Electromagnetics 3(3,0)** Introduction to electric fields and potentials, dielectrics, capacitance, resistance, magnetic field, forces, work and energy, inductance, time-varying fields, and Maxwell's equations. *Preq:* E C E 262, MTHSC 206, PHYS 221.
- E C E 381 Fields, Waves, and Circuits 3(3,0)** Covers foundation of circuit theory, transmission lines and circuits, plane-wave propagation, fiber optics, radiation and antennas, and coupled circuits. *Preq:* E C E 380, MTHSC 208.
- E C E 399, H399 Creative Inquiry—Electrical and Computer Engineering 1-4(14,0)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.
- E C E 404, 604 Semiconductor Devices 3(3,0)** Consideration of the principles of operation, external characteristics, and applications of some of the more important semiconductor devices presently available. *Preq:* E C E 320. *Coreq:* MTHSC 311 or 434.
- E C E 405 Design Projects in Electrical and Computer Engineering 1-3(0,2-6)** Individually defined projects oriented toward providing experience in establishment of objectives and criteria, synthesis, analysis, construction, testing, and evaluation. Develops student creativity through the solution of open-ended problems. Includes individual instruction in design methodology. May be repeated for a maximum of three credits. *Preq:* E C E 330 or 409, consent of project supervisor.
- E C E 406, 606 Introduction to Microelectronics Processing 3(3,0)** Microelectronic processing, MOS and bipolar monolithic circuit fabrication, thick and thin film hybrid fabrication, applications to linear and digital circuits, fundamentals of device design. *Preq:* E C E 320. *Coreq:* MTHSC 311 or 434.
- E C E 409 Continuous and Discrete Systems Design 3(3,0)** Introduction to classical linear control systems. Topics include continuous and discrete descriptions of systems, time and frequency response, stability, system specification, system design of continuous and discrete systems. *Preq:* E C E 330. *Coreq:* E C E 495.
- E C E 410, 610 Modern Control Theory 3(3,0)** Introduction to modern control theory. Topics include fundamentals of matrix algebra, state space analysis and design, nonlinear systems and optimal control. *Preq:* E C E 409.
- E C E 412 Electrical Machines Laboratory 1(0,2)** Selected experiments to familiarize students with characteristics of transformers, DC and AC motors and generators. Measurement techniques and component modeling are included. *Coreq:* MTHSC 434 or consent of instructor. *Preq or Coreq:* E C E 360 or 419.
- E C E 417, 617 Elements of Software Engineering 3(3,0)** Foundations of software design, reasoning about software, the calculus of programs, survey of formal specification techniques and design languages. *Preq:* E C E 329, 352, MTHSC 419.

- E C E 418, 618 Power System Analysis 3(3,0)** Study of power system planning and operational problems. Topics include load flow, economic dispatch, fault studies, transient stability, and control of problems. System modeling and computer solutions are emphasized through class projects. *Prq:* E C E 360, 380.
- E C E 419, 619 Electric Machines and Drives 3(3,0)** Performance, characteristics, and modeling of AC and DC machines during steady-state and transient conditions. Introduction to power electronics devices and their use in adjustable speed motor drives. *Prq:* E C E 321, 360, 380. *Coreq:* MTHSC 434 or consent of instructor.
- E C E 420 Renewable Energy Penetration on the Power Grid 3(3,0)** Introduces the basic definition of electrical power, interfacing primary sources, generator/load characteristics, and renewable energy resources. Topics include solar energy grid interfacing, wind energy grid interfacing, battery charging/management, harmonic distortion, voltage sags, and national standards. *Prq:* E C E 307 or 320.
- E C E 422, 622 Electronic System Design I 3(2,2)** Emphasizes the application of theory and skills to the design, building, and testing of an electronic system with both analog and digital components. Application varies each semester. Computer software tools are used extensively in the design process. *Prq:* E C E 321, 330, 360, 371, 381.
- E C E 427 Communications Systems 3(3,0)** Study of communication systems design and analysis. Topics include signals and spectra, baseband signaling and detection in noise, digital and analog modulation and demodulation techniques, communications link budget analysis. *Prq:* E C E 317, 330.
- E C E 429, 629 Organization of Computers 3(3,0)** Computer organization and architecture. Topics include a review of logic circuits, bus structures, memory organization, interrupt structures, arithmetic units, input-output structures, state generation, central processor organization, control function implementation, and data communication. Registered Transfer Language (RTL) for description and design of digital systems. *Prq:* E C E 272 or consent of instructor.
- E C E 430, H430, 630 Digital Communications 3(3,0)** Introduction to modern digital communication systems, emphasizing modulation and detection, taking into account the effects of noise. *Prq:* E C E 317, 330; and consent of instructor for 430 (consent not required for H430 or 630).
- E C E 431, 631 Digital Electronics 3(2,2)** Considers electronic devices and circuits of importance to digital computer operation and to other areas of electrical engineering. Topics include active and passive waveshaping, waveform generation, memory elements, switching, and logic circuits. Experimentation with various types of circuits is provided by laboratory projects. *Prq:* E C E 321. *Coreq:* MTHSC 311 or 434.
- E C E 432, 632 Instrumentation 3(3,0)** Theory and analysis of transducers and related circuits and instrumentation. Generalized configurations and performance characteristics of instruments are considered. Transducer devices for measuring physical parameters such as motion, force, torque, pressure, flow, and temperature are discussed. *Prq:* E C E 321. *Coreq:* MTHSC 311 or 434.
- E C E 435, 635 Grounding and Shielding 3(3,0)** Introduction to electromagnetic compatibility concepts and techniques for students who will be designing or working with electronic systems when they graduate. Topics include electromagnetic interference and noise control, crosstalk and signal integrity, grounding, filtering, shielding, circuit board layout, lighting and electrostatic discharge protection. *Prq:* E C E 381.
- E C E 436, 636 Microwave Circuits 3(3,0)** Analysis of microwave networks comprising transmission lines, waveguides, passive elements, interconnects, and active solid state microwave circuits. Use of modern CAD tools to design RF/Microwave passive/active networks. Fabrication of typical circuits. *Prq:* E C E 381 or equivalent. *Coreq:* MTHSC 311 or 434.
- E C E 438, 638 Computer Communications 3(3,0)** Digital data transmission techniques, modems and communications channels, communications software and protocols, multiprocessors and distributed processing; concurrency and cooperation of dispersed processors. *Prq:* Senior standing in Electrical or Computer Engineering or Computer Science or consent of instructor.
- E C E 439, 639 Fiber Optics 3(3,0)** Covers the underlying principles of design for optical fibers in practical systems. Examines optical fiber as a wave-guide using wave optics and ray optics. Discusses design criteria for using mono- and multi-mode fibers. Other topics include fabrication, measurement. *Prq:* E C E 381. *Coreq:* MTHSC 434 or consent of instructor.
- E C E 440, 640 Performance Analysis of Local Computer Networks 3(3,0)** Introduction to the design and performance analysis of local computer networks. Emphasizes performance analysis of representative multi-access procedures. Three common types of networks are considered in detail. *Prq:* E C E 272, 317.
- E C E 442, 642 Knowledge Engineering 3(3,0)** Introduction to the theoretical and practical aspects of knowledge engineering or applied artificial intelligence. Topics include symbolic representation structures and manipulation, unification, production systems and structures, rule-based and expert systems, planning and AI system architectures; system design in PROLOG and LISP. Project is required. *Prq:* E C E 329, 352.
- E C E 446, 646 Antennas and Propagation 3(3,0)** Study of the theoretical and practical aspects of antenna design and utilization, input impedances, structural considerations, and wave propagation. *Prq:* E C E 330, 381 or 436, MTHSC 311 or 434.
- E C E 449, 649 Computer Network Security 3(1,4)** Hands-on practicum in the administration and security of modern network service emphasizing intrusion prevention techniques, detection, and recovery. *Prq:* Senior standing in Computer Engineering.
- E C E 453 Software Practicum 3(1,6)** Students design and implement a software system that satisfies both a requirements and specifications document. The resulting system is tested for compliance. *Prq:* E C E 329, 352.
- E C E 455, 655 Robot Manipulators 3(3,0)** Analysis of robot manipulator systems with special focus on interaction of these technologies with society. Emphasis is on rigid-link robot manipulator systems. Topics include history of robot technology, kinematics, dynamics, control, and operator interfaces. Case studies reinforce impact of robot technology on society and vice versa. *Prq:* MTHSC 206, 311, or consent of instructor.
- E C E (M E) 456, 656 Fundamentals of Robotics 3(3,0)** See M E 456.
- E C E 457 Fundamentals of Wind Power 3(3,0)** Introduces wind turbine systems, including wind energy potential and application to power generation. Topics include wind energy principles, wind site assessment, wind turbine components, power generation machinery control systems, connection to the electric grid, and maintenance. *Prq:* E C E 308 or 320 or consent of instructor.
- E C E 459, 659 Integrated Circuit Design 3(2,2)** Design concepts and factors influencing the choice of technology; fundamental MOS device design; silicon foundries, custom and semicustom integrated circuits; computer-aided design software/hardware trends and future developments; hands-on use of CAD tools to design standard library cells; systems design considerations, testing, and packaging. *Prq:* E C E 321. *Coreq:* MTHSC 311 or 434.
- E C E 460 Computer-Aided Analysis and Design 3(3,0)** Principles and methods suited to the solution of engineering problems on the digital computer. Topics include widely used methods for the solution of the systems of algebraic and/or differential equations which arise in modeling of engineering systems, data approximation and curve fitting, continuous system simulation languages, and design-oriented programming systems. *Prq:* E C E 262, MTHSC 311, 434, or consent of instructor.
- E C E 461 Fundamentals of Solar Energy 3(3,0)** Introduces solar energy conversion systems. Topics include environmental benefits of solar energy, solar thermal systems, concentration solar power, photovoltaic (PV) cell design and manufacturing, sizing of PV system, hybrid photovoltaic/thermal systems, energy storage, and urban/rural applications. *Prq:* E C E 320 or consent of instructor.
- E C E 467, 667 Introduction to Digital Signal Processing 3(3,0)** Introduction to characteristics, design, and applications of discrete time systems; design of digital filters; introduction to the Fast Fourier Transform (FFT); LSI hardware for signal processing applications. *Prq:* E C E 330.
- E C E 468, 668 Embedded Computing 3(2,2)** Principles of using computing in the larger context of a system. Topics include bus and processor design types (e.g. microprocessor, microcontroller, DSP), codecs, digital circuit power management, real time scheduling, and embedded operating systems. Lab work consists of projects on embedded hardware (e.g. PC-104+). *Prq:* CPSC 212 and E C E 371 or consent of instructor.
- E C E 473, 673 Introduction to Parallel Systems 3(3,0)** Introduces parallel computer architectures and their programming. Includes an introduction to MPI and OpenMP and a number of engineering problems, including numerical simulations. Introduces scalability analysis. *Prq:* E C E 322 or 329 or equivalent.

E C E H491 Undergraduate Honors Research 1-6 Individual research projects conducted under the direct supervision and guidance of a faculty member. May be repeated for a maximum of six credits.

E C E 492, 692 Special Problems 1-3 Special assignment in electrical or computer engineering. Some typical assignments include computer programs, term papers, technical literature searches, hardware projects, and design project leadership. May be taken only once for credit.

E C E 493, 693 Selected Topics 1-3(1-3,0) Classroom study of current and new technical developments in electrical and computer engineering. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of instructor.

E C E 495 Integrated System Design I 2(1,3) Considers engineering design of systems in a continuous process of project definition, planning, execution, and evaluation. This process includes consideration of both technical and non-technical factors in design. Strong emphasis is placed on the development of effective technical communications skills, particularly oral communications competency. *Preq:* Electrical Engineering major and E C E 320, 330, 360 and 380; or Computer Engineering major and E C E 322 and 352.

E C E 496 Integrated System Design II 2(0,6) Project-oriented course which brings together electrical and computer engineering students of dissimilar training in teams or project groups. Group assignments are designed to develop an appreciation for individual and creative thinking, as well as team effort. *Preq:* Electrical Engineering major and E C E 321, 371, 381, 409 and 495; or Computer Engineering major and E C E 409 and 495.

E C E 499, H499 Creative Inquiry—Electrical and Computer Engineering 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

ELEMENTARY EDUCATION

Professor: D. P. Reinking; *Associate Professors:* D. A. Smith; *Assistant Professors:* C. C. Deaton, D. B. Fleming, M. J. Spearman, R. D. Washington; *Clinical Faculty:* R. A. Kaminski; *Lecturers:* W. E. Holton, R. I. Jones, J. S. Wright

ED EL 304 Instructional Planning, Management, and Communications 3(3,0) Provides students with knowledge and techniques for short- and long-term planning of developmentally appropriate lessons. Students learn how to structure ADEPT lessons and activities to meet the needs of students; and learn techniques for time and behavior management, organization and effective communication with school audiences. *Preq:* ED F 334, admission to the professional level.

ED EL 310 Arts in the Elementary School 3(3,0) Introduces skills, theories and practices used to integrate visual arts, drama, music and dance in the elementary classroom. Emphasizes philosophies associated with art education, content information, curriculum for diverse learners, and use of tools, media, materials and techniques. *Preq:* Admission to the professional level.

ED EL 311 Teaching Diverse Populations 3(3,0) Preservice teachers examine the role of teachers as they relate to culturally appropriate curricula, instruction, and evaluation. *Preq:* Admission to the professional level.

ED EL 321 Physical Education Methods for Classroom Teachers 3(3,0) Provides education majors with a basic understanding of the methods and techniques utilized in teaching elementary physical education. Emphasizes acquiring a basic understanding of the movement education approach and the ability to teach integrated lessons utilizing this approach. *Preq:* Junior standing, admission to the professional level.

ED EL 401 Elementary Field Experience 3(0,9) Practical classroom experience prior to the student teaching semester for Elementary Education majors. For a twelve-week period, students spend two hours per week in schools observing, tutoring individuals, conducting small group activities, and teaching the class. To be taken Pass/Fail only. *Preq:* ED F 334; concurrent enrollment in ED EL 488 and READ 460; admission to the professional level.

ED EL 451 Elementary Methods in Science Teaching 3(2,3) Development of process skills, technical skills, and attitudes needed to foster increased confidence and commitment to the teaching of elementary science, with emphasis on teaching strategies and techniques and their implications for what we know of how children learn science. *Preq:* Elementary Education science requirements; concurrent enrollment in ED EL 401, 487, 488 and READ 460, admission to the professional level.

ED EL 452 Elementary Methods in Mathematics Teaching 3(2,3) Special emphasis is given to the development of understanding, skills, and attitudes in the elementary curriculum with focus on strategies, techniques, and materials for teaching elementary mathematics. *Preq:* General Education mathematics requirement; admission to the professional level.

ED EL 458 Health Education Methods for the Classroom Teacher 3(3,0) Study of the content, methodology, and resource materials necessary for teaching comprehensive health education in public schools. Emphasizes the National Health Education Standards and the health behaviors of youth that are allied with the Coordinated School Health Program. *Preq:* Minimum grade-point ratio of 2.0.

ED EL 467 Principles and Strategies for Teaching English to Speakers of Other Languages (ESOL) in Elementary School Settings 3(3,0) Introduces preservice teachers to theories and principles related to second language acquisition as applied in culturally and linguistically responsive classrooms. Presents instructional models and strategies for teaching the language acquisition process within a context of academics supportive of English language learners (ELLs) and their needs. *Preq:* Admission to the professional level.

ED EL 481 Directed Teaching in the Elementary School 12(1,33) Supervised observation and teaching experiences in cooperation with selected elementary schools. Restricted to seniors or graduates who have completed prerequisite courses. *Preq:* ED EL 321, 401, 451, 452, 487, 488, READ 461; admission to the professional level, consent of area committee chair.

ED EL 487 Elementary Methods in Social Studies Teaching 3(2,3) Introduction to methods, materials, and techniques needed to teach social studies in the elementary schools. *Preq:* HIST 101, 102, 172, or 173; GEOG 101 or 103; concurrent enrollment in ED EL 401, 451, 452, 488 (for Elementary majors) and READ 461; admission to the professional level; consent of instructor.

ED EL 488 Elementary Methods in Language Arts Teaching 3(2,3) Introduction for pre-service teachers to the skills of the language arts other than reading and the methods, materials, and techniques needed to teach these skills to students in the elementary school. *Preq:* ENGL 385; concurrent enrollment in ED EL 401, 451, 452, 487, READ 461 (for Elementary majors); admission to the professional level or consent of instructor.

ENGINEERING

Professor: M. M. Cooper, *Chair*; *Associate Professor:* W. J. Park; *Assistant Professors:* L. C. Benson, Z. S. Hazari, G. D. Potvin, K. C. Madavan, J. M. Trenor; *Senior Lecturers:* J. C. Minor, E. A. Stephan; *Lecturers:* D. R. Bowman, S. C. Brandon

ENGR 101 Introduction to Engineering 1(0,2) Introduction to the engineering profession and engineering disciplines for the purpose of assisting students in their selection of an engineering major. Professional ethics, technical communications, word processing, and electronic communications are taught. Credit toward a degree will be given for only one of ENGR 101 or CES 101.

ENGR 110 Engineering Problems Workshop 1(0,2) Workshop devoted to the analysis and solution of engineering-oriented problems. Representative problems taken from the different fields of engineering are used to illustrate such analytical and problem-solving techniques as estimation and approximation, numerical aids to computation, and solutions by graphical methods.

ENGR 120, H120 Engineering Problem Solving and Design 3(1,4) Methodology and practice of engineering problem solving and engineering design. Selected computer tools, teamwork, and communication modes are employed. Ethics, safety, economics, and environmental concerns are considered. *Preq:* ENGR 101, MTHSC 106. *Coreq:* PHYS 122.

ENGR 130 Engineering Fundamentals 2(1,2) Students formulate and solve engineering problems using advanced spreadsheet applications, dimensional analysis, graphical representation of various physical phenomena, mathematical models and statistics. Various forms of technical communication are emphasized. Credit toward a degree will be given for only one of ENGR 130 or 141. *Preq:* C E S 102; *Coreq:* MTHSC 106 or 107.

ENGR 141, H141 Programming and Problem Solving 3(2,2) Students formulate and solve engineering problems using MATLAB; estimate answers for comparison to computed solutions; read, interpret and write programs, instructions and output; iterate, evaluate conditional statements; and debug. Various forms of technical communication are emphasized. Credit toward a degree will be given for only one of ENGR 130 or 141. *Preq:* C E S 102; *Coreq:* MTHSC 106 or 107. *Coreq for honors students:* MTHSC 108.

ENGR 150 Introduction to Materials 1(1,0) Introduction to materials used in modern technology. Different materials (metals, ceramics, and polymers) and different forms (bulk, fibers, gels, thin films, etc.) are discussed in the context of their application to consumer products, structural composites, refractories, biomedical implants, and electronic and optical materials. *Preq:* Enrollment in General Engineering or consent of instructor.

ENGR 180 Computers in Engineering 3(2,3) Introduction to the use of computers in engineering analysis, design, and communications. A high-level programming language and other software are used on microcomputers. *Preq:* Engineering major; knowledge of a computer language. *Coreq:* MTHSC 106.

ENGR 190, H190 Special Projects in Engineering I 1-3(1-3,0) Individual or group projects in engineering. Projects may be interdisciplinary in nature and may involve analysis, design, and/or implementation. Instruction in use of necessary tools and test equipment is included when appropriate. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

ENGR 290, H290 Special Projects in Engineering II 1-3(1-3,0) Individual or group projects in engineering. Projects may be interdisciplinary in nature and may involve analysis, design, and/or implementation. Instruction in use of necessary tools and test equipment is included when appropriate. May be repeated for a maximum of six credits. *Preq:* Sophomore standing and consent of instructor.

ENGR 390, H390 Special Projects in Engineering III 1-3(1-3,0) Individual or group projects in engineering. Projects may be interdisciplinary in nature and may involve analysis, design, and/or implementation. Instruction in use of necessary tools and test equipment is included when appropriate. May be repeated for a maximum of six credits. *Preq:* Junior standing and consent of instructor.

ENGR 490, H490 Special Projects in Engineering IV 1-3(1-3,0) Individual or group projects in engineering. Projects may be interdisciplinary in nature and may involve analysis, design, and/or implementation. Instruction in use of necessary tools and test equipment is included when appropriate. May be repeated for a maximum of six credits. *Preq:* Senior standing and consent of instructor.

ENGINEERING GRAPHICS

Lecturer: N. Yasmin

E G 208, H208 Engineering Graphics and Machine Design 2(1,2) Introduction to engineering graphics and machine design. Sketching and CAD tools are used to visualize, communicate, rapid prototype and analyze engineering problems. Credit toward a degree will be given for only one of E G 208, 209, or 210. *Coreq:* ENGR 141; for honors students, MTHSC 108 also.

E G 209 Introduction to Engineering/Computer Graphics 2(1,3) Introduction to engineering graphics principles. Sketching and CAD tools are used to visualize, communicate, and perform graphical analysis of engineering problems. Credit toward a degree will be given for only one of E G 208, 209, or 210. *Coreq:* ENGR 130 or 141.

E G 210, H210 Computer-Aided Design and Engineering Applications 2(1,2) Introduction to graphics applications for engineering and related professions. 2-D and 3-D drawings are used to visualize, communicate, rapid prototype and analyze engineering problems. Engineering applications include site plans, contour plots, grading, and architectural, transportation and hydrology drawings. Credit toward a degree will be given for only one of E G 208, 209, or 210. *Coreq:* ENGR 130; for honors students, MTHSC 108 also.

E G 412, 612 Interactive Computer Graphics 3(3,0) Graphics hardware and display technology; reduction and presentation of engineering data; techniques of geometrical transformations, perspective, and model manipulation; methodology of computer-aided design; application of higher-level software to engineering problems. *Preq:* E G 208 and MTHSC 208 or consent of instructor.

E G 490, 690 Special Topics in Engineering and Computer Graphics 1-3(1-3,0) Comprehensive study of any computer-aided topic in engineering graphics not covered in other courses. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

ENGINEERING MECHANICS

Professors: N. M. Aziz, S. D. Schiff; *Assistant Professors:* N. B. Kaye, B. G. Nielson, W. Pang, F. Y. Testik; *Lecturer:* M. Sternhagen

E M 202, H202 Engineering Mechanics: Dynamics 3(3,0) Continuation of E M 201. Principal topics are kinematics and kinetics of particles and rigid bodies of finite size. Techniques of vector mathematics are employed. *Preq:* C E 201, MTHSC 206.

ENGLISH

Professors: R. E. Barfield, A. Bennett, W. K. Chapman, S. J. Hilligoss, T. W. Howard, M. J. Jacobi, S. B. Katz, G. W. Koon, L. J. Morrissey, *Chair:* R. B. Palmer, V. J. Vitanza, D. H. Winchell, M. R. Winchell, A. P. Young; *Associate Professors:* S. M. Ashton, C. A. Hayes, M. H. Martin, K. L. Morris, C. E. Paul, E. K. Sparks, S. S. Taylor, S. D. Williams; *Assistant Professors:* C. F. Bushnell, H. Ding, J. B. Field, T. A. Fishman, J. R. Holmevik, M. L. LeMahieu, K. S. Manganello, B. M. McGrath, E. J. Rivlin, J. C. Sample, A. Skrodzka-Bates; *Visiting Professor:* S. Eisminger; *Visiting Assistant Professors:* J. R. Smith, R. R. Thomas; *Lecturers:* S. T. Allred, C. A. Benson, C. W. Boswell, M. P. Boyer, L. R. Brown-Pressly, L. Childress, J. L. Collins, N. P. Conway, A. S. Cowden, J. Dinolfo, T. W. Fillippo, D. P. Galvin, L. A. Garren, M. S. Geren, W. H. Heath, A. Heaton, K. Keith, M. W. King, L. R. Knight, A. P. Kudera, A. N. Monaghan, M. D. Neal, E. M. Pope, B. J. Ramirez, P. D. Randall, D. Reiss, A. M. Rogers, M. R. Santamaria, M. Smart, K. L. Sol, M. J. Standley, E. A. Stansell, W. A. Stanton, A. N. Swords, J. D. Warner, G. R. Watkins, C. J. Wrenn

ENGL 101, H101 Composition I 3(3,0) Training in correct and effective expression in brief expository essays; review of the fundamentals of grammar and punctuation; instruction in common expository methods.

ENGL 102, H102 Composition II 3(3,0) Continued emphasis on correct and effective expression; training in the organization and writing of the research report. *Preq:* ENGL 101.

ENGL 103, H103 Accelerated Composition 3(3,1) Training in composing correct and effective expository and argumentative essays, including writing documented essays. Students placed in ENGL 103 receive credit for ENGL 101 after completing ENGL 103 with a C or better. Students who have received credit for ENGL 102 will not be allowed to enroll in or receive credit for ENGL 103. *Preq:* Satisfactory score on departmental placement exam.

ENGL 111 English as a Second Language 3(3,2) Special course for students learning English as a second language. Intensive study and drill in American English pronunciation and listening comprehension. Required of all foreign students who do not make a satisfactory grade on screening examination in oral English. To be taken Pass/Fail only. Carries no credit for graduation.

ENGL 190 Introduction to the English Major 2(2,0) Orientation to the English major as a discipline and as a preparation for a range of careers. Introduction to the digital portfolio as a place to collect, synthesize, and reflect on learning. Required of English majors, recommended for minors.

ENGL 202, H202 The Major Forms of Literature 3(3,0) Study of the basic structures and elements of fiction, poetry, and drama, including literary and critical theory, with readings in American, British, and world literature. Proficiency in composition must be demonstrated. *Preq:* ENGL 102.

ENGL H210 Introduction to Literary Study 3(3,0) Literature and composition course for honors students who have exempted ENGL 101 and 102. Readings in American, English, and world literature and advanced training in writing and research. *Preq:* Exemption from ENGL 101 and 102 or consent of instructor.

ENGL 211 Introduction to the Writing and Publication Studies Major 3(3,0) Introduces the Writing and Publication Studies major and provides an overview of courses, possible writing interests within the major, and career possibilities. Students gain an understanding of the importance of theory, close reading, textual analysis, and research methodologies. Faculty representing various writing specialties present to students. *Preq:* ENGL 102.

ENGL 212, H212 World Literature 3(3,0) Introduction to selected works in continental European literature in translation from Homer to the modern era, together with some Asian classics, with emphasis on major authors. *Preq:* ENGL 102 or 103.

ENGL 213, H213 British Literature 3(3,0) Introduction to selected authors and major periods of the British literary tradition, from the Middle Ages to World War II, with attention to poetry, fiction, and drama. *Preq:* ENGL 102 or 103.

ENGL 214, H214 American Literature 3(3,0) Introduction to selected authors and major periods of the American literary tradition from 1620 to 1945. *Preq:* ENGL 102 or 103.

- ENGL 215, H215 Literature in 20th and 21st-Century Contexts** 3(3,0) Introduction to major contemporary cultural movements via selected authors in 20th- and 21st-century literature, primarily American and British, with attention to poetry, fiction, and drama since World War II. *Preq:* ENGL 102 or 103.
- ENGL 217 Vocabulary Building** 3(3,0) Development of a useful discriminating vocabulary for writing, speaking, and reading. Student notebooks and proficiency quizzes. *Preq:* ENGL 103.
- ENGL 231 Introduction to Journalism** 3(3,0) Instruction and practice in writing for mass media; editorial responsibilities. *Preq:* ENGL 103.
- ENGL 265 Introduction to Editing** 3(3,0) Introduction to the practice of editing texts. Includes instruction in the principles and symbols of copy-editing and proof-reading as well as work with electronic editing tools. Also addresses editor's role in different types of editing, including copy-editing, comprehensive editing, and developmental editing for paper and electronic publication.
- ENGL (G W) 301, H301 Great Books of the Western World** 3(3,0) See G W 301.
- ENGL 304 Business Writing** 3(3,0) Introduction to audience, context, purpose, and writing strategies for texts common in professional business settings: memoranda, letters, reports, and proposals. Includes individual and team projects. *Preq:* Junior standing.
- ENGL 310 Critical Writing About Literature** 3(3,0) Terms and techniques for literary analysis, including close reading, vocabulary for analysis, research and writing skills, casebook study of critical approaches. Discussion of poetry and genres preferred. *Preq:* Sophomore literature (or concurrent enrollment) or consent of instructor.
- ENGL 312 Advanced Composition** 3(3,0) Workshop in practical writing focusing on principles and style. *Preq:* Sophomore literature or consent of instructor.
- ENGL 314, H314 Technical Writing** 3(3,0) Intensive, project-based application of principles of audience, context, purpose, and writing strategies of technical writing: proposals, reports, communication deliverables. Individual and team projects. *Preq:* Junior standing.
- ENGL 315 Scientific Writing and Communication** 3(3,0) Study and practice of rhetorical conventions in professional scientific communication through the analysis and writing of major genres. Focuses on principles, strategies, and styles of scientific argumentation and audience adaptation in written, oral, and visual media. Intended for students majoring in the sciences. *Preq:* ENGL 103; BIOL 103 and 104, or 110 and 111; Junior standing, or consent of instructor.
- ENGL 316 Writing and International Trade** 3(3,0) Students complete projects demanding a variety of communications skills that professionals in international trade need; sensitivity to foreign audiences and cultures in oral and written communication, electronic and graphic communication, collaborative writing and management. *Preq:* Sophomore literature.
- ENGL 332 Visual Communication** 3(3,0) Hands-on survey of visual communication theories and practices used by technical communicators in business and industry environments. Class meets regularly in computer classrooms. *Preq:* Sophomore literature; ENGL 211 or consent of instructor.
- ENGL 333 Reporting for the News Media** 3(3,0) Practical experience in gathering and writing news and feature copy for the media, concentrating on print journalism; examination of the role of the modern journalist; laws governing the profession; journalistic ethics. *Preq:* ENGL 231 or consent of instructor.
- ENGL 334 Feature Writing** 3(3,0) Practical experience in writing feature articles for newspapers, magazines, and free-lance markets. *Preq:* ENGL 231 or consent of instructor.
- ENGL 335 Editing for Newspapers** 3(3,0) Examination of the editing process of newspapers and magazines. Practical experience in article selection, copy-editing, headline writing, and page design. *Preq:* ENGL 231 or consent of instructor.
- ENGL 345 The Structure of Fiction** 3(3,0) Introduction to the creative writing and critical study of prose fiction. *Preq:* ENGL 310 or consent of instructor.
- ENGL 346 The Structure of Poetry** 3(3,0) Introduction to the creative writing and critical study of poetry. *Preq:* ENGL 310 or consent of instructor.
- ENGL (THEA) 347 The Structure of Drama** 3(3,0) See THEA 347.
- ENGL 348 The Structure of the Screenplay** 3(3,0) Introduction to the creative writing and critical study of the screenplay. Screenplays vary from semester to semester. May be repeated once for credit with consent of instructor. *Preq:* ENGL 310 or consent of instructor.
- ENGL 349 Technology and the Popular Imagination** 3(3,0) Examines relationship between technology and fiction and creative nonfictional texts, including print, film, and electronic media. *Preq:* Sophomore literature or consent of instructor.
- ENGL 350 Mythology** 3(3,0) Study of the great myths of the world emphasizing their applications to literature. *Preq:* Sophomore literature or consent of instructor.
- ENGL 353 Ethnic American Literature** 3(3,0) Critical examination of essays, poetry, fiction, and drama written by members of a variety of American racial and ethnic groups, such as Native Americans, African Americans, Chicano/Mexican Americans, Asian Americans, Italian Americans, and American Jews. *Preq:* Sophomore literature or consent of instructor.
- ENGL 355 Popular Culture** 3(3,0) Examination of the nature, functions, history, and impact upon American society of best sellers, popular magazines, television, movies, and other like phenomena. *Preq:* Sophomore literature or consent of instructor.
- ENGL 356 Science Fiction** 3(3,0) Readings in science fiction from the 17th century to the present, with special emphasis on writers since Verne and Wells. *Preq:* Sophomore literature or consent of instructor.
- ENGL 357 Film** 3(2,3) Examination of the film medium as an art form: its history, how films are made, why certain types of films (western, horror movies, etc.) have become popular, and how critical theories provide standards for judging film. *Preq:* Sophomore literature or consent of instructor.
- ENGL 359 Special Topics in Language, Literature, Rhetoric, or Culture** 3(3,0) Studies in selected topics in the fields of English language, literature, culture and communication. Specific titles and course descriptions are announced for each semester. May be repeated for a maximum of six credits with consent of department chair. *Preq:* Sophomore literature or consent of instructor.
- ENGL H367 Special Topics for Honors Students** 3(3,0) Varied topics of general interest in literature, language, rhetoric, or culture for all honors students. Specific topics announced each semester. May be repeated for a maximum of nine credits. *Preq:* Sophomore literature or consent of instructor.
- ENGL 380 British and American Women Writers** 3(3,0) Poetry, drama, fiction, and prose by established and little-known women writers in Britain and America. Particular attention to works treating themes and issues concerning women's lives. Readings on such topics as women and work, education, religion, creativity. *Preq:* Sophomore literature or consent of instructor.
- ENGL 385 Children's Literature** 3(3,0) Reading and analysis in a wide range of authors, illustrators, and genres appropriate for children from preschool through eighth grade, classic as well as modern. Critical approaches include historical, thematic, and social. *Preq:* Sophomore literature or consent of instructor.
- ENGL 386 Adolescent Literature** 3(3,0) Reading and analysis of literature written for readers age 12-18. Emphasis is on historical context, chief themes and motifs, and censorship issues, as well as connections with classic literature. *Preq:* Sophomore literature or consent of instructor.
- ENGL 387 Book History** 3(3,0) Examines the material and theoretical constructions of the book. Covers both historical and contemporary dimensions of dissemination, reception, artistry, and influence of books. *Preq:* ENGL 103.
- ENGL 390 Electronic Portfolio Studio** 1(1,0) Studio course for English majors to complete their portfolios. *Preq:* ENGL 190, 310 (or concurrent enrollment).
- ENGL 396 British Literature Survey I** 3(3,0) Examines key texts in British literature to 1789. *Preq:* Sophomore literature or consent of instructor.
- ENGL 397 British Literature Survey II** 3(3,0) Examines key texts of British literature from 1789 to the present. *Preq:* Sophomore literature or consent of instructor.
- ENGL 398 American Literature Survey I** 3(3,0) Examines key texts of American literature from beginnings of European settlement to the Civil War in historical context. *Preq:* Sophomore literature or consent of instructor.
- ENGL 399 American Literature Survey II** 3(3,0) Examines key texts of American literature from the Civil War to the present in historical context. *Preq:* Sophomore literature or consent of instructor.

ENGL 400, 600 The English Language 3(3,0) Studies in English usage and historical development of the language. *Preq:* ENGL 310 or consent of instructor.

ENGL 401, 601 Grammar Survey 3(3,0) Survey of modern grammars with a focus on exploring the impact structural grammar has had on traditional grammar. Recommended for English teachers. *Preq:* ENGL 310 or consent of instructor.

ENGL 403 The Classics in Translation 3(3,0) Examination of Homer's *Iliad* and *Odyssey*, Virgil's *Aeneid*, and Ovid's *Metamorphoses*. A few shorter works by other Greek and Roman writers may also be read. *Preq:* ENGL 310 or consent of instructor.

ENGL 407, 607 The Medieval Period 3(3,0) Selected works of Old and Middle English literature, exclusive of Chaucer. *Preq:* ENGL 310 or consent of instructor.

ENGL 408, 608 Chaucer 3(3,0) Selected readings in Middle English from *The Canterbury Tales* and other works by Chaucer. *Preq:* ENGL 310 or consent of instructor.

ENGL 410, 610 Drama of English Renaissance 3(3,0) Selected readings in non-Shakespearean dramatic literature of the 16th and 17th centuries. *Preq:* ENGL 310 or consent of instructor.

ENGL 411, 611 Shakespeare 3(3,0) Study of selected tragedies, comedies, and history plays of Shakespeare. Required of all English majors. *Preq:* ENGL 310 or consent of instructor.

ENGL 414, 614 Milton 3(3,0) Development of Milton's art and thought from the minor poems and selected prose through *Paradise Lost*, *Paradise Regained*, and *Samson Agonistes*, set against the background of the late Renaissance. *Preq:* ENGL 310 or consent of instructor.

ENGL 415, 615 The Restoration and Eighteenth Century 3(3,0) Readings in Dryden, Swift, Pope, and Dr. Johnson. *Preq:* ENGL 310 or consent of instructor.

ENGL 416, 616 The Romantic Period 3(3,0) Readings from the poetry and critical prose of Blake, Wordsworth, Coleridge, Byron, Shelley, Keats, and other representative figures. *Preq:* ENGL 310 or consent of instructor.

ENGL 417, 617 The Victorian Period 3(3,0) Reading from the poetry and nonfiction prose of selected Victorian authors, including works of Carlyle, Tennyson, Browning, Arnold, and other representative figures. *Preq:* ENGL 310 or consent of instructor.

ENGL 418, 618 The English Novel 3(3,0) Study of the English novel from its 18th century beginnings through the Victorian Period. *Preq:* ENGL 310 or consent of instructor.

ENGL 419, 619 Post-Colonial Studies 3(3,0) Selected readings in post-colonial literature and theory, focusing on issues of nationalism, migration, resistance, race, language, and master narratives. *Preq:* ENGL 310 or consent of instructor.

ENGL 420 American Literature to 1799 3(3,0) Focused study of authors, movements, themes, critical approaches, and genres in literature of colonial and early national America from early European explorations of the continent to 1799. *Preq:* ENGL 310 or consent of instructor.

ENGL 421 American Literature from 1800 to 1899 3(3,0) Focused study of authors, movements, themes, critical approaches, and genres in the poetry and prose of major American authors and literary movements from the nineteenth century. *Preq:* ENGL 310 or consent of instructor.

ENGL 425, 625 The American Novel 3(3,0) Survey of the most significant forms and themes of the American novel from its beginnings to 1900. *Preq:* ENGL 310 or consent of instructor.

ENGL 426, 626 Southern Literature 3(3,0) Intellectual and literary achievement of the South from 1607 to the present, with emphasis on the writers of the 19th century. *Preq:* ENGL 310 or consent of instructor.

ENGL 427, 627 Agrarianism and the Humanistic Tradition 3(3,0) Focuses on the importance of agriculture and rural life to the humanistic tradition of Western Civilization from antiquity through the early years of the American republic. *Preq:* ENGL 310 or consent of instructor.

ENGL 428, 628 Contemporary Literature 3(3,0) Focuses on American, British, and other fiction, poetry, and drama from Post-World War II to the present. *Preq:* ENGL 310 or consent of instructor.

ENGL 429, 629 Dramatic Literature I 3(3,0) Selected reading in the dramatic literature from the classical era of Greece and Rome to the Renaissance. *Preq:* ENGL 310 or consent of instructor.

ENGL (THEA) 430, 630 Dramatic Literature II 3(3,0) Principles and progress of drama from the Restoration to the present; analysis of representative plays; critical reports; discussion of trends in dramatic literature. *Preq:* ENGL 310 or consent of instructor.

ENGL 431, 631 Modern Poetry 3(3,0) The modern tradition in English and American poetry from Yeats to the present; relevant critical essays. *Preq:* ENGL 310 or consent of instructor.

ENGL 432, 632 Modern Fiction 3(3,0) American and British novels and short stories of the 20th century. *Preq:* ENGL 310 or consent of instructor.

ENGL 433, 633 The Anglo-Irish Literary Tradition 3(3,0) Exploration of the unique literary heritage and achievement of English-language Irish writers in the 19th and 20th centuries. Major figures of the Irish tradition: W. B. Yeats, James Joyce, Samuel Beckett, and other writers; consideration of the specifically Irish aspects of their works. *Preq:* ENGL 310 or consent of instructor.

ENGL 434, 634 Environmental Literature 3(3,0) Survey of literature that examines the relationship between human beings and the natural world, including analysis of environmental themes in myths and legends and in selected poetry and prose of 19th and 20th-century England and America. *Preq:* ENGL 310 or consent of instructor.

ENGL 435, 635 Literary Criticism 3(3,0) Major critical approaches to literature. *Preq:* ENGL 310 or consent of instructor.

ENGL (W S) 436, 636 Feminist Literary Criticism 3(3,0) Introduces the germinal works of feminist literary theory and criticism. Outlines the development of modern literary criticism by studying feminist versions of the major critical methodologies. *Preq:* ENGL 310 or consent of instructor.

ENGL 437, 637 Directed Studies 1-3(1-3,0) Class and tutorial work for students with special interests or projects in American, British, or European literature outside the scope of existing courses. Applications must be approved during the registration period of the semester preceding the one in which directed studies will occur. May be repeated by arrangement with the department. *Preq:* ENGL 310 or consent of instructor.

ENGL H438 Departmental Honors Research 3(3,0) Research for the preparation of an honors project. *Preq:* ENGL 310 or consent of instructor.

ENGL H439 Departmental Honors Project 3(3,0) Preparation of an honors project. *Preq:* ENGL 310 or consent of instructor.

ENGL 440, 640 Literary Theory 3(3,0) Examination of how approaches such as Marxism, Psychoanalysis, Feminism, Deconstruction, New Historicism, Post-Colonialism, Cultural Studies, and Queer Theory answer the question, "What is literature?" *Preq:* ENGL 310 or consent of instructor.

ENGL 441 Literary Editing 3(3,0) Examination of how the theories and practices of editing construct texts, stressing the problems and objectives of editing and providing practical experience with literary editing. *Preq:* Sophomore literature.

ENGL 442, 642 Cultural Studies 3(3,0) Investigation of the similarities and connections between a wide variety of cultural products, events, and practices—from fast food to opera to online shopping—using theories ranging from Marxism to hybridity. *Preq:* ENGL 310 or consent of instructor.

ENGL 444, 644 Renaissance Literature 3(3,0) Selected readings in non-Shakespearean British literature from 1500–1660. Includes drama, poetry, and prose. *Preq:* ENGL 310 or consent of instructor.

ENGL 445, 645 Fiction Workshop 3(3,0) Workshop in the creative writing of prose fiction. May be repeated once for credit. *Preq:* ENGL 345 or consent of instructor.

ENGL 446, 646 Poetry Workshop 3(3,0) Workshop in the creative writing of poetry. May be repeated once for credit. *Preq:* ENGL 346 or consent of instructor.

ENGL (THEA) 447, 647 Playwriting Workshop 3(0,3) See THEA 447.

ENGL 448, 648 Screenwriting Workshop 3(3,0) Workshop in the creative writing of screenplays. May be repeated once for credit. *Preq:* ENGL 348 or consent of instructor.

ENGL 449, 649 Creative Non-Fiction 3(3,0) Advanced workshop in writing non-fiction prose for magazine and free-lance markets. *Preq:* ENGL 312 or 334 or consent of instructor.

ENGL 450, 650 Film Genres 3(2,3) Advanced study of films that have similar subjects, themes, and techniques, including such genres as the Western, horror, gangster, science fiction, musical, and/or screwball comedy. Also considers nontraditional genres, screen irony, genre theory, and historical evolution of genres. Topics vary. *Preq:* ENGL 357 or consent of instructor.

- ENGL (COMM) 451, 651 Film Theory and Criticism** 3(2,3) Advanced study into the theory of film/video making emphasizing understanding a variety of critical methods to approach a film. Examines the history of film theory and defines the many schools of film criticism, including realism, formalism, feminism, semiotics, Marxism, and expressionism. *Preq:* ENGL 357 or consent of instructor.
- ENGL 452, 652 Great Directors** 3(2,3) Intensive study of one to three film directors emphasizing understanding the entire canon of each director. Students study similarities in techniques, shifts in thematic emphasis, and critical methodologies for approaching the works of each director. Topics vary. *Preq:* ENGL 357 or consent of instructor.
- ENGL 453, 653 Sexuality and the Cinema** 3(2,3) Examination of male/female sexual roles and their evolution in American genre films, avant-garde cinema, and international films. Includes the study of movies in relation to cultural values and social stereotypes, introduction to feminist film theory, and consideration of film pornography. *Preq:* ENGL 357 or consent of instructor.
- ENGL (LANG) 454 Selected Topics in International Film** 3(2,3) See LANG 454.
- ENGL 455, 655 American Humor** 3(3,0) Native American humor of the 19th and 20th centuries. *Preq:* ENGL 310 or consent of instructor.
- ENGL (HUM) 456, 656 Literature and Arts of the Holocaust** 3(3,0) Addresses the Holocaust through literature, art, architecture, music, and film. Beginning with historical, political, and economic forces that contributed to the Holocaust, course then focuses on highly diverse creative responses to this event—responses that often reflect the difficulties and politics of these commemorative gestures. *Preq:* ENGL 310 or consent of instructor.
- ENGL 459, 659 Advanced Special Topics in Language, Literature, or Culture** 3(3,0) Advanced studies in topics not central to other English courses, such as certain authors, works, genres, themes, or areas of knowledge and culture. Specific topics are announced when offered. May be repeated once for credit with department chair's consent. *Preq:* ENGL 310 or consent of instructor.
- ENGL 460 Issues in Writing Technologies** 3(3,0) Examination of writing technologies from different historical periods. Investigates how writing is understood, circulated, legislated, and protected in terms of its production technology. *Preq:* Sophomore literature; ENGL 211 or consent of instructor.
- ENGL 463, 663 Topics in Literature to 1699** 3(3,0) Selected readings in literature from antiquity through the 17th century for focused study of authors, movements, themes, critical approaches, and genres. Topics vary and are constructed by individual faculty. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* ENGL 310 or consent of instructor.
- ENGL 464, 664 Topics in Literature from 1700 to 1899** 3(3,0) Selected readings in 18th and 19th-century literature for focused study of authors, movements, themes, critical approaches, and genres. Special topics vary and are constructed by individual faculty. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* ENGL 310 or consent of instructor.
- ENGL 465, 665 Topics in Literature from 1900** 3(3,0) Selected readings in 20th- and 21st-century literature for focused study of authors, movements, themes, critical approaches, and genres. Topics vary and are constructed by individual faculty. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* ENGL 310 or consent of instructor.
- ENGL 475, 675 Writing for Electronic Media** 3(3,0) Workshop in new forms of writing and hypertextual design for interactive electronic media, including social networks, online and video communities. May be repeated once for credit at the undergraduate level. *Preq:* ENGL 310 or consent of instructor.
- ENGL 478, 678 Digital Literacy** 3(3,0) Examines how technology has expanded ideas of literacies and texts. Includes reading, studying and analyzing print and digital texts to determine how digital techniques change patterns of reading and how readers make sense of electronic texts. *Preq:* ENGL 310 or consent of instructor.
- ENGL 482, 682 African-American Fiction and Nonfiction** 3(3,0) Critical examination of the various forms and genres of African-American prose including the novel, short fiction, autobiography, nonfiction, and oratory with some attention to emerging theories about African-American culture and its impact on American cultural life in general. *Preq:* ENGL 310 or consent of instructor.
- ENGL 483, 683 African-American Poetry, Drama, and Film** 3(3,0) Studies in the various forms, themes, and genres of African-American poetry, drama, and film with some attention to emerging theories about African-American culture and its impact on American cultural life in general. *Preq:* ENGL 310 or consent of instructor.
- ENGL 485, 685 Composition for Teachers** 3(3,0) Practical training in teaching composition: finding workable topics, organizing and developing observations and ideas, evaluating themes, and creative writing. *Preq:* ENGL 310 or consent of instructor.
- ENGL 488, 688 Genre and Activity Theory** 3(3,0) Examination of the forms that texts take, of the print and digital media in which they are composed, and of the ways they circulate among experts, in the public, and around the world. *Preq:* Junior standing.
- ENGL 489, 689 Special Topics in Writing and Publication Studies** 3(3,0) Selected readings from topics in writing and publication studies, emphasizing areas such as major theories, practices, research, and critical approaches. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* ENGL 310 or consent of instructor.
- ENGL 490, 690 Advanced Technical and Business Writing** 3(3,0) Advanced work in writing proposals, manuals, reports and publishable articles. Client-based and collaborative writing. *Preq:* ENGL 304 or 314 or consent of instructor.
- ENGL (COMM) 491, 691 Classical Rhetoric** 3(3,0) Traces the development of rhetoric from Protagoras through Isocrates, Plato, Aristotle, Cicero and Quintillian and considers questions essential to understanding persuasive theory and practices. *Preq:* ENGL 310 or consent of instructor.
- ENGL (COMM) 492, 692 Modern Rhetoric** 3(3,0) Examines the "new rhetorics" of the 20th century, which are grounded in classical rhetoric but include findings from biology, psychology, linguistics and anthropology, among other disciplines. *Preq:* ENGL 310 or consent of instructor.
- ENGL 494, 694 Writing About Science** 3(3,0) Advanced work in scientific writing and editing for peer and lay audiences. *Preq:* ENGL 310 or consent of instructor.
- ENGL 495, 695 Technical Editing** 3(3,0) Practical experience in editing and preparing technical manuscripts for publication. General introduction to the functions of the technical editor. *Preq:* ENGL 314 or consent of instructor.
- ENGL 496 Senior Seminar** 3(3,0) Capstone course requiring participation and a substantial essay, allowing graduating English majors the chance to work closely with faculty and other English majors on a special topic in the advanced study of literature, rhetoric, writing, and/or publication studies. *Preq:* ENGL 310, Senior standing in English, or consent of instructor.
- ENGL 498, 698 Studio Composition and Communication** 3(3,0) Preparation for students to work in the Class of 1941 Studio for Student Communication. *Preq:* Sophomore standing or consent of instructor.
- ENGL 499 Practicum in Writing** 3(3,0) Students apply their knowledge of concepts and principles to a substantive project involving their internship experiences and/or writing and publishing interests. To be taken Pass/Fail only. *Preq:* Sophomore literature, Junior standing in English.

ENTOMOLOGY

Professors: P. H. Adler, R. G. Bellinger, E. P. Benson, J. D. Culin, W. M. Hood, J. C. Morse, P. A. Zungoli, Interim Chair; *Assistant Professor:* M. W. Turnbull

- ENT 200 Six-Legged Science** 3(3,0) Introduction to insects, their various relationships with humans, other animals, and plants. The general nature of this course makes it beneficial to all students regardless of specialty. Not open to students who have received credit for ENT 301 or equivalent.
- ENT 201 Selected Topics** 1(1,0) Discussion course covering topics dealing with insects and related arthropods. Subjects are chosen to reflect issues of current interest as well as those having significance in human history. May be repeated for a maximum of three credits.
- ENT 300 Environmental Entomology** 3(3,0) Exploration of diversity and roles of insects in natural and affected environments, impact of insects and pesticides on environmental quality, and discussion of environmental ethics in entomological science. *Preq:* Any biological or physical science.
- ENT (BIOSC) 301 Insect Biology and Diversity** 4(3,3) Introduction to the study of insects, with emphasis on their structure, function, ecology, and behavior. Identification of commonly encountered species is highlighted. Relationships between insect and human populations are discussed. Control technologies are introduced, with emphasis on environmentally responsible tactics. Offered fall semester only.

ENT 308 Apiculture 3(2,3) Detailed study of the honey bee and its economic importance in pollination and honey production. Attention is given to bee behavior, colony management, equipment, honey-plant identification, and honey production and processing. *Preq:* BIOL 104/106 and consent of instructor.

ENT (BIOSC) 400, H400, 600 Insect Morphology 4(3,3) Study of insect structure in relation to function and of the variation of form in insects. *Preq:* ENT 301.

ENT 401, H401, 601 Insect Pests of Ornamental Plants and Shade Trees 3(2,3) Recognition, biology, damage, and control of insect pests of woody and other ornamental plants and shade trees. *Preq:* ENT 301.

ENT 404, H404, 604 Urban Entomology 3(3,0) Study of pests common to the urban environment with emphasis on arthropod pest biology, pest importance, and management strategies. Students learn both theoretical and practical aspects of urban pest management. *Preq:* BIOL 103 and 104, or 110 and 111, or ENT 301, or consent of instructor.

ENT (PL PA) 406, 606 Diseases and Insects of Turfgrasses 2(2,0) See PL PA 406.

ENT 407, 607 Applied Agricultural Entomology 4(3,3) Topics include recognition, biology, damage, and control of economically important insects and mites found on major Southeastern field, fruit, nut, and vegetable crops. Principles and practices of crop protection, including pesticide application, economic basis for decision making, and development of scouting programs are introduced. *Preq:* ENT 301 or equivalent.

ENT (PL PA) 408 Diseases and Insects of Turfgrasses Laboratory 1(0,3) See PL PA 408.

ENT 409, H409, 609 Urban Entomology Laboratory 1(0,3) Identification of household and structural pests common to the urban environment. Students also gain hands-on experience in termite and general pest control. *Preq:* BIOL 103 and 104, or 110 and 111, or ENT 301, or consent of instructor; concurrent enrollment in ENT 404.

ENT (BIOSC) 415, 615 Insect Taxonomy 3(1,6) Identification of the principal families of the major orders of adult insects. Laboratory work consists of intensive practice of such identification. Lecture material deals with theoretical discussion of taxonomic features observed in the laboratory. *Preq:* ENT (BIOSC) 400 or consent of instructor.

ENT (ENTOX) 430, 630 Toxicology 3(3,0) See ENTOX 430.

ENT (BIOSC) 436, 636 Insect Behavior 3(2,3) Fundamentals of insect behavior in an evolutionary and ecological perspective. Laboratory emphasizes generation and testing of hypotheses and observation, description, and quantification of insect behavior. *Preq:* ENT 301 or consent of instructor.

ENT (BIOSC) 455, H455, 655 Medical and Veterinary Entomology 3(2,3) Insects and their arthropod relatives which are of economic importance in their effect on man and animals. *Preq:* ENT 301 or consent of instructor.

ENT 461 Directed Research in Entomology 1-3(0,3-9) Development of a senior thesis based on a research problem in a selected entomological area. Emphasis is on integrating the knowledge gained in the student's program with the results of the research project. May be repeated for a maximum of three credits. *Preq:* Senior standing, consent of instructor.

ENT (BIOSC, W F B) 469, H469, 669 Aquatic Insects 3(1,6) Identification, life history, habitats, and interrelationships of aquatic insects; techniques of qualitative field collecting; important literature and research workers. *Preq:* ENT 301 or consent of instructor.

ENT 490 Practicum 1-4 Supervised entomological learning opportunity providing highly individualized experiences to complement other programs and courses. Must be prearranged at least two months in advance. Students must file written reports midway during enrollment period and at its conclusion and must appear for oral evaluation at the end of the period. *Preq:* Junior standing and consent of instructor.

ENT (GEN) 495, 695 Insect Biotechnology 3(3,0) Considers many unique genetic features exhibited by insects and describes the applications of biotechnology to enhance useful products from insects and to affect the control of destructive insects. *Preq:* ENT 301, GEN 302.

ENT (SSCS) 496 Selected Topics in Creative Inquiry 1-2(1-2,0) See SSCS 496.

ENT (SSCS) 497 Selected Topics in Creative Inquiry Laboratory 1-2(0,3-6) See SSCS 497.

ENVIRONMENTAL AND NATURAL RESOURCES

Professors: G. W. Eidson, M. Espey, J. D. Lanham, P. A. Layton, V. B. Shelburne; *Associate Professors:* A. Johnson, C. J. Post, S. R. Templeton; *Assistant Professor:* B. L. Brown

E N R 101 Introduction to Environmental and Natural Resources I 1(1,0) Informative overview of environmental and natural resources and their impact on society. Education and career opportunities are emphasized.

E N R 102 Introduction to Environmental and Natural Resources II 1(1,0) Continuation of E N R 101 with continuing emphasis on education and career opportunities. Current issues and basic science related to the natural resources professions are introduced.

E N R 302 Natural Resources Measurements 3(2,3) Introduction to measurements of natural resources including land, vegetation, animal habitat, water quality and quantity, climate, and recreation. Remote sensing techniques are also introduced. May not be taken for credit by Forest Resource Management majors. *Coreq:* EX ST 301.

E N R 312 Environmental Risks and Society 3(3,0) Examines the perception, analysis and management of natural and technological risks in modern society, such as how society responds to natural or human-caused disasters and global environmental challenges; and the roles of experts, the government and the general public. Case studies foster debate and critical analysis of controversial issues. *Preq:* Junior standing and completion of the General Education mathematics requirement, or consent of instructor.

E N R (BIOSC) 413, 613 Restoration Ecology 3(3,0) Applies ecological principles to the restoration of disturbed terrestrial, wetland, and aquatic ecosystems. Includes the restoration of soils and waterways, of flora and fauna, and of natural ecological processes such as plant succession and nutrient cycling. *Preq:* Introductory course in ecology or conservation biology, consent of instructor.

E N R (FOR) 416, 616 Forest Policy and Administration 3(3,0) See FOR 416.

E N R 429, 629 Environmental Law and Policy 3(3,0) Develops an understanding of the three branches of government that affect and dictate use and protection of natural resources. Attention is given to major federal environmental statutes. Includes examination of how policy is developed, implemented, and evaluated in the public and private sectors. *Preq:* Junior standing or consent of instructor.

E N R (FOR) 434, 634 Geographic Information Systems for Landscape Planning 3(2,3) See FOR 434.

E N R 450, 650 Conservation Issues 3(3,0) Interactive study and discussion of issues related to the conservation of natural resources, emphasizing current issues in the conservation of biodiversity, identification of conflicting issues between consumptive and nonconsumptive resource management, and development of viable solutions for conservation of natural resources. *Preq:* W F B (BIOSC) 313 or consent of instructor.

ENVIRONMENTAL ENGINEERING AND SCIENCE

Professors: T. A. DeVol, A. W. Elzerman, R. W. Falta Jr., R. A. Fjeld, D. L. Freedman, T. Karanfil, C. M. Lee, L. C. Murdoch, T. J. Overcamp; *Associate Professors:* E. R. Carraway, M. A. Schlautman; *Assistant Professors:* T. A. Kendall, S. A. Miller, S. M. Moysey, Y. Yang; *Lecturer:* M. L. Thompson

EE&S 201 Environmental Engineering Fundamentals I 3(3,0) Overview of topics and engineering application areas that comprise the environmental engineering profession. Significant emphasis is given to development of oral and written communication skills needed by the engineering professional and application of engineering fundamentals to environmental systems. *Preq:* MTHSC 108; CH 102.

EE&S 202 Environmental Engineering Fundamentals II 4(3,3) Overview of fundamentals related to environmental engineering processes, including water treatment, wastewater treatment, solid and hazardous waste management, air pollution control, risk assessment, and pollution prevention strategies. Laboratories cover measurement techniques and applications to process engineering. *Preq:* EE&S 201.

EE&S 401, 601 Environmental Engineering 3(3,0) Introduction to the field of environmental engineering. Topics include environmental phenomena, impact of pollutants in the aquatic environment, solid-waste management, air pollution control, radiological health, and simple water and wastewater treatment systems. *Preq:* Junior standing in engineering or consent of instructor. *Coreq:* C E 341, CH E 311, M E 308, or consent of instructor.

EE&S 402, 602 Water and Waste Treatment Systems 3(3,0) Study of fundamental principles, rational design considerations, and operational procedures of the unit operations and processes employed in water and waste treatment. Both physiochemical and biological treatment techniques are discussed. Introduces the integration of unit operations and processes into water and waste treatment systems. *Preq:* EE&S 401; and C E 341, CH E 311, M E 308, or equivalent; or consent of instructor.

EE&S 410, 610 Environmental Radiation Protection I 3(3,0) Fundamental principles of radiological health and radiation safety. Topics include radiation fundamentals, basic concepts of environmental radiation protection, internal and external dosimetry, environmental dose calculations and radiation protection standards. *Preq:* Consent of instructor.

EE&S 411, 611 Ionizing Radiation Detection and Measurement 3(2,3) Laboratory exercises in ionizing radiation detection and measurements. Topics include nuclear electronics; counting statistics; radiation interactions; basic gas, scintillation, and semiconductor detectors; gamma-ray spectroscopy; health physics survey instrumentation; and thermoluminescent dosimetry. *Preq:* EE&S 410 or consent of instructor.

EE&S 430, 630 Air Pollution Engineering 3(3,0) Introductory course in air pollution and its control. Topics include air pollutants and effects, sources, dispersion models, engineering controls, and air-quality legislation. *Preq:* Senior standing in engineering or physical sciences.

EE&S 450 Professional Seminar 1(1,0) Covers various topics related to skills and techniques for evaluating career opportunities, seeking and obtaining environmental engineering employment, career development, professional registration, professional ethics, and other factors necessary for achieving success in a professional career. Course enables students to make decisions that will help them succeed in their careers. *Preq:* Senior standing.

EE&S (B E, FOR) 451, H451, 651 Newman Seminar and Lecture Series in Natural Resources Engineering 1(0,2) See B E 451.

EE&S 475 Capstone Design Project 3(1,6) Students apply creativity and their engineering knowledge to solve open-ended environmental engineering problems. Problems are formulated and solutions are evaluated by faculty and practicing engineers. Oral and written communication skills are developed through presentations, correspondence and project reports. *Preq:* Senior standing.

EE&S 480, 680 Environmental Risk Assessment 3(3,0) Quantitative estimation of human health risk posed by the release of a contaminant to the environment. Topics include methods for analyzing emission rate, environmental transport, exposure, and health effects; methods of uncertainty analysis; and the role of risk assessment in environmental regulation and environmental decision making. *Preq:* EE&S 401 or consent of instructor.

EE&S (B E) 484, 684 Municipal Solid Waste Management 3(3,0) Introduction to the problems, regulations, collection, handling, recycling, and disposal of municipal solid wastes in the urban and rural sectors. Emphasizes an integrated waste-management system with resource recovery, composting, incineration, landfill disposals, and their costs. *Preq:* Senior standing in engineering or science or consent of instructor.

EE&S 485, 685 Hazardous Waste Management 3(3,0) Introduction to the problems, regulations, treatment, and ultimate disposal of hazardous and toxic materials. Spill cleanup, groundwater transport, land disposal, incineration, and treatment technologies are discussed. *Preq:* EN SP 200 or EE&S 401 or consent of instructor; two semesters of general chemistry.

EE&S 486, 686 Pollution Prevention and Industrial Ecology 3(3,0) Topics include pollution prevention technology, the role of pollution prevention within a corporation, source reduction and recycling assessments, treatment to reduce disposal, life-cycle assessment, design for environment, and industrial ecology. Emphasizes case studies. *Preq:* Senior standing in College of Engineering and Science.

EE&S 490, H490, 690 Special Projects 1-3(1-3,0) Studies or laboratory investigations on special topics in the environmental engineering and science field. Arranged on a project basis with a maximum of individual student effort and a minimum of staff guidance. May be repeated for a maximum of three credits. *Preq:* Consent of instructor.

EE&S 491 Selected Topics in Environmental Engineering 1-3(1-3,0) Study of the dynamic role of environmental engineering in maintaining environmental quality. A comprehensive study of any phase of environmental engineering. May be repeated for credit, but only if different topics are covered. *Preq:* Consent of department chair.

ENVIRONMENTAL SCIENCE AND POLICY

Professors: A. W. Elzerman, Coordinator; R. H. Becker, P. A. Layton, J. B. London, J. R. Wagner; *Associate Professors:* R. D. Bixler, L. D. Fredendall

EN SP 200 Introduction to Environmental Science 3(3,0) Basic principles of environmental science, including ecology, energy, resources, waste management; and air, water, and soil pollution. Consideration of issues, specific cases, investigative approaches, and remedial actions. *Preq:* Sophomore standing and two semesters of freshman chemistry or biology.

EN SP (AGRIC) 315, H315 Environment and Agriculture 3(3,0) See AGRIC 315.

EN SP 400 Studies in Environmental Science 3(3,0) Study of historical perspectives, attitudes, and government policy within the framework of environmental case studies to illustrate the interaction between human and natural factors as they mutually affect the environment and man's ability to deal with that environment. *Preq:* EN SP 200 or consent of instructor.

EN SP 472, 672 Environmental Planning and Control 2(2,0) Application of planning and control to effective environmental quality improvement. Considers water supply and treatment, wastewater treatment and disposal, solid waste disposal, air pollution abatement, and land use and zoning from the standpoint of control. Not intended for graduate students in engineering. *Preq:* Consent of instructor.

ENVIRONMENTAL TOXICOLOGY

Professors: W. V. Baird, D. E. Brune, A. W. Elzerman, V. S. Gallicchio, A. R. Johnson, S. J. Klaine, C. M. Lee, D. V. Maurice, J. C. Morse, V. L. Quisenberry, C. D. Rice, J. H. Rodgers, T. L. Schwedler; *Associate Professors:* W. W. Bowerman, E. R. Carraway, J. W. Castle, M. A. Schlautman; *Assistant Professors:* W. L. Bauerle, D. G. Bielenberg, J. Brumaghim, P. van den Hurk, Y. Yang

ENTOX 400, H400, 600 Wildlife Toxicology 3(3,0) Assessment of impacts of toxic substances on reproduction, health, and well-being of wildlife species; acute and chronic effects of agricultural chemicals, pesticides, hazardous waste, industrial waste, and oil releases are discussed. *Preq:* BIOCH 305 or organic chemistry, one year of general biology, W F B 350 or consent of instructor.

ENTOX 421, H421, 621 Chemical Sources and Fate in Environmental Systems 3(3,0) Discusses chemical cycles in the environment on global and microcosm scales. Examines the dependence of fate processes on physical and chemical properties and environmental conditions. Addresses breakdown, movement, and transport of selected toxicants to illustrate the mechanisms that govern chemical fate. *Preq:* Organic and analytical chemistry or consent of instructor.

ENTOX (ENT) 430, 630 Toxicology 3(3,0) Basic principles of toxicology including quantitation of toxicity, toxicokinetics, biochemical action of poisons, and environmental toxicology are studied. Acute and chronic effects of various classes of poisons (e.g., pesticides, drugs, metals, and industrial pollutants) are discussed in relation to typical routes of exposure and regulatory testing methods. *Preq:* Organic Chemistry, one year of general biology, or consent of instructor.

ENTOX 437, 637 Ecotoxicology 3(3,0) Study of the effects of stressors on the ecosystem. Explores the integrative relationships that comprise the field of ecotoxicology in a hierarchical format that focuses on the various levels of ecological organization. *Preq:* ENTOX 430 or consent of instructor.

ENTOX 446 Soil and Water Quality: Fundamentals 3(3,0) Studies those aspects of water quality that are influenced by soil systems. Many water quality concerns arise from land-applied chemicals, natural or manufactured. Basic soil and water chemistry principles including sorption, solution chemistry, and soil chemical transport are studied. *Preq:* CSENV 475 and CH 224, or consent of instructor.

ENTOX 447 Soil and Water Quality: Applications 3(3,0) Potential for water quality concerns arising from land application of natural or manufactured chemicals is varied. Case studies of potential water quality concerns related to fertilizers, pesticides, biosolids, manures, and other sources are presented. Practices that can improve water quality are also studied and evaluated. *Preq:* CH 224 and CSENV 475, or consent of instructor.

ENTOX (CSENV, GEOL) 485, 685 Environmental Soil Chemistry 3(3,0) See CSENV 485.

EXECUTIVE LEADERSHIP AND ENTREPRENEURSHIP

Professors: D. L. Bodde, W. B. Gartner, C. H. St. John;
Associate Professor: W. H. Stewart; *Assistant Professor:*
S. A. Jones; *Adjunct Assistant Professor:* M. R. Gevaert;
Lecturers: M. G. Mino, J. R. Wilken, D. Wyman

E L E 301 Executive Leadership and Entrepreneurship I 3(3,0) Cross-disciplinary course which seeks to create an appreciation of the opportunities and uncertainties in an entrepreneur's life through extensive readings and interactions with entrepreneurs. *Preq:* Sophomore standing.

E L E (MKT) 314 New Venture Creation I 3(3,0)
See MKT 314.

E L E (MGT) 315 New Venture Creation II 3(3,0)
See MGT 315.

E L E (ECON) 321 Economics of Innovation 3(3,0)
See ECON 321.

E L E (PO SC, PSYCH, SOC) 356 Social Science of Entrepreneurship 3(3,0) See SOC 356.

E L E 400, 600 Technology Entrepreneurship 3(3,0) Introduction to technology entrepreneurship emphasizing ideation, opportunity assessment, market and technology forecasting, intellectual property protection, financial modeling and business valuation, project management, and cross-functional team building. *Preq:* Junior standing in science or engineering.

E L E 401 Executive Leadership and Entrepreneurship II 3(3,0) Continuation of E L E 301 with extensive use of a computer-simulated business start-up. *Preq:* E L E 301.

E L E 499 Executive Leadership and Entrepreneurship III 3-6(1-3,6-12) Continuation of E L E 301 and 401. Directed practical study of entrepreneurship and leadership. Students work closely with external infant firms to develop new products and bring existing products to market successfully. *Preq:* E L E 401.

EXPERIMENTAL STATISTICS

Professors: W. C. Bridges, Jr., P. D. Gerard, H. S. Hill Jr.,
Chair: J. R. Rieck; *Assistant Professors:* J. Luo, J. Sharp;
Senior Lecturer: R. Martinez-Dawson; *Lecturer:*
R. S. Dubsky

EX ST 222 Statistics in Everyday Life 3(3,0) Focuses on the role of statistics in a variety of areas including politics, medicine, environmental issues, advertising, and sports. Students explore common statistical misconceptions and develop an understanding of how principles of probability and statistics affect many aspects of everyday life. Not open to students who have received credit for EX ST 301, MTHSC 301, 302, or 309. *Preq:* Satisfactory score on the Clemson Mathematics Placement Test or consent of department.

EX ST 301, H301 Introductory Statistics 3(2,2) Basic concepts and methods of statistical inference; organization and presentation of data, elementary probability, measures of central tendency and variation, tests of significance, sampling, simple linear regression and correlation. Stresses the role of statistics in interpreting research and the general application of the methods. Credit toward a degree will be given for only one of EX ST 301, MTHSC 301, 302, 309.

EX ST 311 Introductory Statistics II 3(2,2) Introduction to simple linear and multiple regression, principles of experimental design, and analysis of data using parametric and nonparametric techniques. Analysis of data is conducted using SAS. Examples come primarily from agriculture, food, life and health sciences, forestry, and natural resources. Credit toward a degree will be given for only one of EX ST 311 or MGT 310. *Preq:* EX ST 301 or equivalent with a C or better.

EX ST 402, 602 Introduction to Statistical Computing 3(3,0) Introduction to statistical computing packages. Topics include data importation, basic descriptive statistic computation, basic graphic preparation, and statistical analysis methods and procedures. *Preq:* EX ST 301.

EX ST 411, 611 Statistical Methods for Process Development and Control 3(3,0) Experimental design techniques for use in process development, application of screening experiments and response surface experiments, techniques for process control with implications for product quality control. Includes discussions of the use of statistical computer analyses and interpretations including computer-generated graphics. *Preq:* MTHSC 206 or consent of instructor.

EX ST 462 Statistics Applied to Economics 3(3,0) Continuation of EX ST 301 emphasizing statistical methods used in the collection, analysis, presentation, and interpretation of economic data. Special attention is given to time-series analysis, the construction of index numbers, and the designing of samples for surveys in the social science fields. *Preq:* EX ST 301.

FINANCE

Professors: J. C. Alexander Jr., M. F. Spivey, T. M. Springer,
N. G. Waller; *Associate Professors:* J. M. Harris Jr.,
A. G. Morgan, J. G. Wolf; *Assistant Professors:* B. N. Cline,
T. Tang, J. Wiley; *Lecturer:* K. D. McMillan

FIN 301 Personal Finance 3(3,0) Analysis of the preparations of personal financial plans. Topics include savings and budgeting, personal taxes, housing and automobile decisions, loans, insurance needs, investments, and retirement needs. May not be counted toward a major or minor in Financial Management.

FIN 304 Risk and Insurance 3(3,0) Studies the nature of risk and the role of insurance in risk management from individual and business viewpoints. Topics include probability, theory of the firm under uncertainty, insurance carriers and contracts, underwriting, and regulation. *Preq:* FIN 306 or 311.

FIN 305 Investment Analysis 3(3,0) Study of techniques useful in analyzing alternative investment opportunities with emphasis on corporate securities. Investment planning and portfolio management are considered. *Preq:* FIN 306 or 311 with a C or better.

FIN 306 Corporation Finance 3(3,0) Introduction to financial management of nonfinancial firms. Includes such topics as analysis of financial statements, financial forecasting, capital budgeting, working capital management, and long-term financing decisions. Credit may not be received for both FIN 306 and 311. *Preq:* ACCT 201; and MTHSC 301 or 309 or EX ST 301.

FIN 307 Principles of Real Estate 3(3,0) Acquaints students with the theories, practices, and principles that govern real estate markets. Major emphasis is on specifics of real estate brokerage, property rights, and ownership; making real estate investment decisions; and financing real estate investments. *Preq:* FIN 306 or 311 with a C or better.

FIN 308 Financial Institutions and Markets 3(3,0) Study of the various types of financial institutions and of topics critical to the financial institutions practitioner. Topics include financial regulations, financial security types and their yields, interest rate risk management, foreign currency risks management, and stock index futures. *Preq:* FIN 306 or 311 with a C or better.

FIN 311, H311 Financial Management I 3(3,0) First in a two-course sequence to provide in-depth exposure to the theory and practice of corporate financial management and to demonstrate how financial management techniques are applied in decision making. Credit may not be received for both FIN 306 and 311. *Preq:* ACCT 201 and 204 each with a C or better; and MTHSC 309 or EX ST 301.

FIN 312, H312 Financial Management II 3(3,0) Continuation of the two-course sequence that begins with FIN 311. *Preq:* FIN 306 or 311 with a C or better.

FIN 398 Creative Inquiry—Finance 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits.

FIN 399 Finance Internship 1-3(1-3,0) Pre-planned, preapproved, faculty-supervised internships to give students on-the-job learning in support of classroom education. Internships must be no fewer than six full-time, consecutive weeks with the same internship provider. Restricted to students with a major or minor in Financial Management. To be taken Pass/Fail only. *Preq:* Consent of instructor.

FIN 402, H402, 602 Advanced Corporate Finance 3(3,0) Study of the decision process and analytical techniques used in evaluating corporate investment and financing decisions. Topics include capital budgeting, capital structure and bankruptcy, valuation, corporate governance, executive compensation, mergers and acquisitions, and restructuring. *Preq:* FIN 312 with a C or better.

FIN 404, H404 Financial Modeling 3(3,0) Helps students develop the practical skills that combine theory, business planning, and forecasting needed to make financial decisions. Emphasizes the use of spreadsheet software used to set up and solve these models. Topics include financial statement analysis, valuation, and cost of capital. *Preq:* FIN 312 with a C or better; CP SC 220 or MGT 218.

FIN 405, H405 Portfolio Management and Theory 3(3,0) Introduction to portfolio management. Includes the underlying theory, managing the equity and the fixed-income portfolios, portfolio evaluation, options-pricing theory, futures markets and instruments. *Preq:* FIN 305 with a C or better.

FIN 406, H406, 606 Analysis and Use of Derivatives 3(3,0) Consideration of the option pricing theory and strategy techniques most commonly used in the market for options. Also considers an overview of the futures markets. Special emphasis is given to interest-rate futures, stock-index futures, and foreign-exchange futures. *Preq:* FIN 305 with a C or better.

FIN 408 Management of Financial Institutions 3(3,0) Detailed study of the operational, marketing, and regulatory aspects of the management of depository financial institutions. Emphasizes decision making through the extensive use of cases. *Preq:* FIN 308 with a C or better.

FIN 409 Professional Financial Planning 3(3,0) Concepts and practical implementation of professional financial planning focusing on essentials of budgeting and saving, risk management, tax planning, investment planning, and retirement and estate planning. Emphasizes integrating these elements into a comprehensive personal financial plan. *Preq:* ACCT 404, 408, FIN 304, 305.

FIN 410, H410 Research in Finance 1-3 Directed research for students interested in careers in finance. Research topic is selected by student and approved by instructor. A formal research paper is required. *Preq:* FIN 306 or 312, consent of instructor.

FIN 411 International Financial Management 3(3,0) Extension of the principles of finance to the international context. Focuses on implications of the existence of multiple currencies and the operations across borders of sovereign nation-states for the multinational corporation. *Preq:* FIN 306 or 312 with a C or better.

FIN 415, 615 Real Estate Investment 3(3,0) Focuses on the structure and analysis of real estate investment emphasizing financial theory and analysis technique. Case study and project-oriented homework assignments facilitate the understanding of real estate investments. *Preq:* FIN 307 with a C or better.

FIN 416, 616 Real Estate Valuation 3(3,0) Advanced course in commercial real estate valuation. Topics include income capitalization, cash equivalency, highest and best use analysis, the cost approach, the direct sales comparison approach, and DCF analysis. *Preq:* FIN 307 with a C or better.

FIN 417, 617 Real Estate Finance 3(3,0) Advanced course applying financial analysis and theory to real estate. Emphasizes mortgage credit analysis and current financing techniques for residential and commercial properties. Topics include financial institutions, syndications, and construction financing. *Preq:* FIN 307 with a C or better.

FIN 498 Creative Inquiry—Finance 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits.

FOOD SCIENCE

Professors: F. H. Barron, K. L. Cason, P. L. Dawson, R. D. Galyean, A. K. Greene, M. E. Kunkel, J. U. McGregor, A. L. Pometto III; *Associate Professors:* F. Chen, M. D. Condasky, A. M. Fraser, V. J. Haley-Zitlin, X. Jiang, J. K. Northcutt; *Senior Lecturer:* R. M. Haliena; *Lecturer:* A. D. Coffee; *Adjunct Professors:* J. C. Acton, C. R. Barmore, R. J. Vander Zanden; *Adjunct Assistant Professors:* G. G. Pearl, E. J. Rhodehamel, P. Wan; *Adjunct Instructors:* R. R. Perdue, L. J. Pfahl, K. G. Schwartz

FD SC 101 Epochs in Man's Struggle for Food 1(1,0) Study of significant developments in food preservation methods and the impact each has had on man's struggle for food.

FD SC 102 Perspectives in Food and Nutrition Sciences 1(1,0) Discussion course covering topics related to food science and human nutrition. Subjects include topics of current interest and involve familiarization with scientific literature in nutrition and food sciences. *Preq:* Food Science major.

FD SC 201 Man and His Food 2(2,0) Study of food and food products emphasizing nutrients, nutrient needs, and the relationship between nutrient intake and health. Also discusses food additives, nutritional awareness (including nutrition labeling), food protection, and the influence of processing on nutritional quality of food.

FD SC 214 Food Resources and Society 3(3,0) Introduces the basics of food science (food chemistry, food microbiology, and food processing principles) and relates how advances in food science have paralleled societal advances and created social controversy.

FD SC 215 Culinary Fundamentals 2(1,3) Emphasizes the safe handling of food utilizing recognized procedures in equipment safety and sanitation. Cooking methods are investigated, along with ingredient functionality and flavor development. Organizational skills utilized in a real-world environment assist students in preparing, presenting and evaluating their finished products. *Preq:* Food Science major or consent of instructor.

FD SC 216 Fundamentals of Baking Science 2(1,3) Emphasizes the science of baking, ingredient functionality, formulas and Bakers Percentages, and various mixing methods used to produce an array of baked products. Organizational skills, utilized in a real world environment, assist students in preparing, presenting and evaluating their finished products. *Preq:* Food Science major or consent of instructor.

FD SC 250 Culinary Science Internship 0 Students experience the science and art of food preparation, with the ultimate object of improving the ease of manufacture as well as the overall quality and nutrition of the food produced. Students are able to observe, interact, and practice principles of culinary sciences. To be taken Pass/Fail only. *Preq:* FD SC 215.

FD SC 301 Food Regulation and Policy 1(1,0) Identifies the role of the FDA and FSIS in food regulations, regulatory compliance and enforcement. Other agencies involved in peripheral decisions are also discussed (U.S. Customs, EPA, USDA-AMS, USDA-APHIS, etc.) Introduces food safety concepts, such as HACCP, GMPs, SSOPs, and food defense/security.

FD SC 304 Evaluation of Dairy Products 2(1,2) Emphasizes sensory evaluation of dairy products. Discusses basic principles of organoleptic evaluation, fundamental rules for scoring and grading dairy products; evaluation of all classes of dairy products based on established grades and score cards.

FD SC 306 Food Service Operations 3(3,0) Principles of management of resources in food service systems. Emphasizes menu planning, types of delivery systems, principles of quantity food production, techniques for cost control and concepts of food science and food safety. *Preq:* FD SC 214 or equivalent or consent of instructor. *Coreq:* FD SC 404, 407.

FD SC 307 Restaurant Food Service Management 3(3,0) Essentials of successful operation of restaurants, including menu design and pricing, marketing, customer satisfaction, purchasing, kitchen operations, and employment relationships.

FD SC 350 Food Science Internship 0 Summer internship offered by Food Science and Human Nutrition Department and the Clemson Micro-Creamery and Food Manufacturing Industries. Students are able to observe, interact, and practice principles of food science within the food industry. To be taken Pass/Fail only. *Preq:* FD SC 214 or consent of instructor.

FD SC 401, H401, 601 Food Chemistry I 4(3,3) Basic composition, structure, and properties of food and the chemistry of changes occurring during processing utilization. *Preq:* BIOCH 305 or consent of instructor.

FD SC 402, H402, 602 Food Chemistry II 4(3,3) Application of theory and procedures for quantitative and qualitative analysis of food ingredients and food products. Methods for protein, moisture, lipid, carbohydrate, ash, fiber, rancidity, color, and vitamin analyses and tests for functional properties of ingredients are examined. *Preq:* BIOCH 305 or consent of instructor.

FD SC 404, 604 Food Preservation and Processing 3(3,0) Principles of food preservation applied to flow processes, ingredient functions, and importance of composition and physical characteristics of foods related to their processing; product recalls and product development concepts. *Preq:* Physics and organic chemistry or biochemistry.

FD SC 406, 606 Food Preservation and Processing Laboratory I 1(0,3) Laboratory exercises on preservation methods, equipment utilized, and processes followed in food manufacture. *Coreq:* FD SC 404.

FD SC 407, 607 Quantity Food Production 2(1,3) Principles of the production of food in quantity for use in food service systems. Emphasizes functions of components of foods and of ingredients in food, and focuses on the quality of the final product, on safe production of food, and on proper use of equipment. *Coreq:* FD SC 306, 404.

FD SC 408, 608 Food Process Engineering 4(3,3) Study of basic engineering principles and their application in food processing operations. Emphasizes the relation between engineering principles and fundamentals of food processing. *Preq:* CH 102, FD SC 214, MTHSC 106, PHYS 207 or 200 or 122 or consent of instructor.

FD SC (PKGSC) 409 Total Quality Management for the Food and Packaging Industries 3(3,0) Introduction to the principles of modern quality management emphasizing quality standards and issues and the practices necessary for food processing and packaging companies to survive in a customer-driven marketplace.

FD SC 410, 610 Food Product Development 4(3,3) A strategic and systems approach to integrated product development practices for developing new food products within a team setting. Focuses on the Stage-Gate process for moving from product idea to launch and application of sensory analysis techniques.

FD SC 417 Seminar 1(1,0) Literature research and oral presentation of a current food science topic.

FD SC 418 Seminar 1(1,0) Literature research and oral presentation of a current food science topic.

FD SC 420, H420 Special Topics in Food Science 1-3(1-3,0) Special topics in food science not covered in other courses. May be repeated for a maximum of 12 credits, but only if different topics are covered. *Preq:* Consent of instructor.

FD SC 421, H421 Special Problems in Food Science 1-4(0,3-12) Independent research investigation in food science areas not conducted in other courses. May be repeated for a maximum of 12 credits. *Preq:* Consent of instructor.

FD SC 430, 630 Dairy Processing and Sanitation 3(2,3) Processing, manufacture and distribution of fluid, frozen, cultured and other dairy products. Emphasizes sanitation in a commercial food processing plant environment, chemical and microbiological aspects, processing procedures, equipment operation, ingredient applications, formulation and functional properties. *Preq:* BIOL 104/106, CH 102.

FD SC 450 Creative Inquiry—Food Science 1-6(1-6,0) Individual or small team research experience in close collaboration with a faculty member. Expands undergraduate learning by application of the scientific method. Research is selected by the student with approval of faculty. May be repeated for a maximum of ten credits.

FD SC 491 Practicum 1-4 Supervised experiential opportunities in the food industry. May be repeated for a maximum of 12 credits. *Preq:* Junior standing and consent of department chair.

FORESTRY

Professors: W. H. Conner, J. W. Foltz, J. D. Lanham, P. A. Layton, *Chair*; A. W. Lee, J. H. Rodgers Jr., V. B. Shelburne, T. J. Straka, G. K. Yarrow; *Associate Professors:* W. R. English, L. R. Gering, A. R. Johnson, C. J. Post, G. G. Wang; *Assistant Professors:* R. F. Baldwin, T. Cushing, E. Mikhailova, R. B. Powell; *Extension Associate:* R. Polomski

FOR 101 Introduction to Forestry 1(1,0) Informative sketch of forestry, forests, and forestry tasks of the nation. Includes education and career opportunities for foresters. Offered fall semester only.

FOR 205 Dendrology 2(1,3) Classification, nomenclature, and identification of the principal forest trees of the United States, their geographical distribution, ecological requirements, and economic importance. Includes field identification of native trees and commonly planted exotics of the Southeast. *Preq:* BIOL 103/105. *Coreq:* FOR 221 or consent of instructor.

FOR 206 Forestry Ecology 3(2,3) Study of the nature of forests and forest trees, how they grow, reproduce, and their relationships to the physical and biological environment. Offered spring semester only. *Preq:* BIOL 103/105, CSENV 202, FOR 205 or consent of instructor.

FOR 221 Forest Biology 3(3,0) Study of woody plant form and function, wood properties, general physiology and forest biomes of North America. Presented as a companion course to dendrology lab. *Preq:* BIOL 103/105. *Coreq:* FOR 205 or consent of instructor.

FOR 227 Arboricultural Field Techniques 1(0,3) Skills and techniques required to safely climb trees for tree maintenance. Emphasizes safety, proper equipment, and basic tree maintenance treatments. To be taken Pass/Fail only.

FOR 251 Forest Communities 2(0,6) Study of forest plant species and their successful status and habitat requirements with respect to landform, soil type, and other appropriate aspects of site classification. *Preq:* FOR 205 or consent of instructor.

FOR 252 Forest Operations 1(0,3) Introduction and tour of forest operations activities throughout South Carolina. Includes timber harvesting, site preparation, and applied silvicultural processes. *Preq:* Junior standing or consent of instructor.

FOR 253 Forest Mensuration 4(0,12) Introduction to measurements of land, individual trees, forest stands, forest products, and the application of mensurational techniques to the statistical and physical design of forest sampling methods, including measurement techniques of non-timber components of forest resources. *Preq:* FOR 205 or consent of instructor.

FOR 254 Forest Products (Summer Camp) 1(0,3) Tour of the forest products industry of South Carolina emphasizing those products and processes of some distinction or special interest. *Preq:* FOR 205 or consent of instructor.

FOR 300 Christmas Tree Production 2(2,0) Theory and practice of establishing, managing, and marketing trees emphasizing Christmas tree production in the South. *Preq:* Consent of instructor.

FOR 302 Forest Biometrics 2(1,3) Application of statistical methods to forestry problems, including sampling theory and methods, growth measurements and prediction, and application of micro-computing to analysis of forestry data. *Preq:* FOR 253. *Coreq:* EX ST 301 or consent of instructor.

FOR 304 Forest Resource Economics 3(3,0) Economic problems and principles involved in the utilization of forest resources and distribution of forest products. Includes analysis of integrated forest operations. *Preq:* ECON 200 or consent of instructor.

FOR 305 Woodland Management 3(2,2) Compendium of forestry subjects providing a broad view of the forest environment as it relates to ecology, management, and utilization of forests, especially those of S.C. Field and laboratory exercises in the fundamentals of forest-land management. Not open to Forest Resource Management majors. *Preq:* BIOL 103/105 or consent of instructor.

FOR 308 Remote Sensing in Forestry 2(1,3) Introduction to remote sensing, aerial photo interpretation, computer mapping, aerial photo timber estimating, and geographical information systems. *Preq:* Forestry summer camp or consent of instructor.

FOR 314 Harvesting and Forest Products 4(3,3) Harvesting of forest products, structure and properties of economically important timbers, and production and properties of primary forest products. *Preq:* Forestry Summer Camp or consent of instructor.

FOR 315 Woodland Ecology 3(3,0) Overview of the forest emphasizing living and nonliving components of the woodland habitat. Understanding man's use of the forest and interpreting the signs of plants, wildlife, and landscapes.

FOR 341 Wood Procurement Practices in the Forest Industry 3(3,0) Study of wood raw material procurement practices currently employed by the forest products industry, including pulp, paper, and related areas. *Preq:* Forestry Summer Camp or consent of instructor.

FOR 400, 600 Public Relations in Natural Resources 3(3,0) Identifying relevant policies, their characteristics and acceptance to natural resource management, and techniques of maintaining appropriate public relations. *Preq:* Senior standing.

FOR 406 Forested Watershed Management 2(1,3) Lectures and discussions on measurements and processes affecting water quality and quantity within watersheds. Introduction to hydrologic principles, geomorphology, and water quality assessment. Discusses best management practices for silviculture and development of a watershed management plan. *Preq:* FOR 315 or consent of instructor.

FOR 408, 608 Wood and Paper Products 3(3,0) Study of wood structures and identification; physical and mechanical properties of wood products; standard testing procedures; manufacture of lumber, plywood, oriented strand board; drying, preservation, grading, and use of wood products. Also discusses common grades of paper and paperboard; fiber sources; pulping and paper-making equipment and processes; chemical recovery process; and environmental issues. *Preq:* Junior standing or consent of instructor.

FOR 410, 610 Harvesting Processes 4(3,3) Study of forest harvesting processes with detailed analysis of production, cost, environmental impacts, safety, transportation, and business considerations. *Preq:* Senior standing or consent of instructor.

FOR 413, 613 Integrated Forest Pest Management 4(3,3) Nature and control of pests of forest trees and products. Focuses on the relation of pests to silviculture, management, and natural forest ecosystems. *Preq:* Junior standing in Forest Resource Management.

FOR 415, 615 Forest Wildlife Management 3(2,3) Principles, practices, and problems of wildlife management emphasizing upland forest game species. Habitat manipulation through use of appropriate silvicultural practices in association with other techniques is evaluated. *Preq:* FOR 460 or consent of instructor.

FOR (E N R) 416, 616 Forest Policy and Administration 3(3,0) Introduction to the development, principles, and legal provisions of forest policy in the United States and an examination of administrative and executive management in forestry.

FOR 417, 617 Forest Resource Management and Regulation 3(3,0) Fundamental principles and analytical techniques in planning, management, and optimization of forest operations. *Preq:* FOR 302, 308, 418, 465.

FOR 418, 618 Forest Resource Valuation 3(3,0) Analysis of capital investment tools and their application to decision making among forestry investment alternatives; valuation of land, timber, and other resources associated with forestry, including the impact of inflation and taxes. *Preq:* FOR 304 or consent of instructor.

FOR 419 Senior Problems 1-3(1-3,0) Problems chosen with faculty approval in selected areas of forestry. With department chair's approval, may be repeated once for credit. *Preq:* Senior standing.

FOR 423, 623 Current Issues in Natural Resources 2(2,0) Lectures in various fields of forestry delivered by selected representatives from forest industries, consultants, agencies, associations, and other forestry operations. Will not be taught when enrollment is less than 15. To be taken Pass/Fail only. *Preq:* Junior standing or consent of instructor.

FOR 425 Forest Resource Management Plans 2(1,3) Development of multiple resource forest management plans. Economic and environmental impacts of implementing management plans. *Preq:* FOR 417 or consent of instructor.

FOR 426, H426 Forest Resource Management Plans Seminar 1(1,0) In-depth exploration of topics and problems presented in FOR 425. To earn honors credit, students must be enrolled in corequisite FOR 425 and earn a B or better in both courses. *Preq:* Senior standing, approval of Department of Forest Resources. *Coreq:* FOR 425.

FOR (HORT) 427, 627 Urban Tree Care 3(3,0) Principles, practices, and problems of protecting and maintaining trees in urban and recreational areas. Examines environmental and biological factors affecting trees in high-use areas, their management and cultural requirements, and the practices necessary for their protection and care as valuable assets in the landscape. *Preq:* Junior standing or consent of instructor.

FOR 431, 631 Recreation Resource Planning in Forest Management 2(1,3) Analysis of forest recreation as a component of multiple-use forest management; techniques of planning; physical and biological effects on forest environments; and forest site, user, and facility management.

FOR 433, 633 GPS Applications 3(2,3) Develops competence in global positioning system (GPS) technology, including theory, methods, and application to natural resources mapping. Topics include basic concepts of GPS; projection systems; types of data; mission planning; and data capture, correction, and export to geographical information systems (GIS). *Preq:* Senior standing or consent of instructor.

FOR (E N R) 434, 634 Geographic Information Systems for Landscape Planning 3(2,3) Develops competence in geographic information systems (GIS) technology and its application to various spatial analysis problems in landscape planning. Topics include data development and management, spatial analysis techniques, critical review of GIS applications, needs analysis and institutional context. GIS hardware and software, hands-on application. Credit may be received for only one of C R P 434, FOR (E N R) 434.

FOR 441, 641 Properties of Wood Products 3(3,0) Basic properties of wood, including the hygroscopic, thermal, electrical, mechanical, and chemical properties; standard testing procedures for wood. *Preq:* Junior standing or consent of instructor.

FOR 442, 642 Manufacture of Wood Products 3(3,0) Study of the manufacture of lumber, plywood, poles, piles; drying, preservation, grading, and uses of wood products. Considers the manufacture of particleboard, flakeboard, oriented-strand board, fiberboard, and paper products. Includes physical, mechanical, and chemical properties and their applications. *Preq:* Consent of instructor.

FOR 444, 644 Forest Products Marketing and International Trade 3(3,0) Study of marketing and international trade practices currently employed by the forest products industry and the application of basic marketing principles and global trade concepts in the industry's current and future environment. *Preq:* FOR 442 or consent of instructor.

FOR 447 Special Problems in Forest Products 1-3(0,3-9) Laboratory, library, or field study of problems in selected areas of forest products. Emphasizes the planning and execution of research and the reporting of results. Research must be conducted under the guidance of a Forest Products faculty member. May be repeated for a maximum of three credits, but only if different topics are covered. *Preq:* Senior standing and consent of instructor supervising the study.

FOR 450, 650 Woody Plant Stress Physiology 3(3,0) Structure, function, and physiology of tree shoot and crown growth, wood formation, diameter growth, root growth, and reproduction, especially as related to stress factors. *Preq:* BIOSC 401 or FOR 460 or consent of instructor.

FOR (B E, EE&S) 451, H451, 651 Newman Seminar and Lecture Series in Natural Resources Engineering 1(0,2) See B E 451.

FOR H461 Silviculture Honors Seminar I 1(1,0) In-depth exploration of topics and problems presented in FOR 465. To earn honors credit, students must be enrolled in FOR 465 and earn a B or better in both courses. *Preq:* Junior standing and approval of Department of Forest Resources. *Coreq:* FOR 465.

FOR H463 Silviculture Honors Seminar II 1(1,0) In-depth exploration of topics and problems presented in FOR 465. To earn honors credit, students must be enrolled in FOR 465 and earn a B or better in both courses. *Preq:* Junior standing and approval of Department of Forest Resources. *Coreq:* FOR 465.

FOR 465, 665 Silviculture 4(3,3) Discussion of the theory and practice of manipulating forests to meet the needs and values of landowners and society in accordance with biological, ecological, and economic principles. *Preq:* FOR 206 and Forestry Summer Camp or consent of instructor.

FOR 480 Selected Topics in Urban Forestry 1-3(1-3,0) Study of selected and varied topics, problems, and issues in urban forestry and arboriculture through readings, class discussion, and individual and group projects. *Preq:* FOR (HORT) 427.

FOR 493 Selected Topics in Forest Resources 1-15(1-15,2-30) Specialized topics not covered in other courses that explore current areas of research and management in forest resources in a format of lecture, lab, or both. May be repeated for a maximum of 15 credits, but only if different topics are covered. *Preq:* Junior standing or consent of instructor.

FOR 498 Senior Portfolio 1(1,0) Collection of Web-based materials representing the creative and scientific papers, presentations, and résumés written by students to satisfy curriculum requirements. Students are informed in F N R 102 and regularly thereafter regarding the format and content of their portfolios. *Preq:* Senior standing in Forest Resource Management. *Coreq:* FOR 425.

FORESTRY AND NATURAL RESOURCES

F N R 102 Forestry and Natural Resources Freshman Portfolio 1(1,0) Informative sketch of forestry, wildlife biology, and natural resources; education and career opportunities for natural resource professionals. Students initiate their Web-based student portfolios, which showcase their skills and experiences (e.g., résumés, accomplishments, and work samples) during their undergraduate degree. To be taken Pass/Fail only. Restricted to Environmental and Natural Resources, Forest Resource Management, Forestry and Natural Resources—Undeclared, and Wildlife and Fisheries Biology majors.

F N R 204 Soil Information Systems 4(3,3) Includes input, storage, analysis, and output of soil information through the use of global positioning systems, direct remote sensing, geographic information systems, and web soil survey. Provides fundamental knowledge of the role of soils in forest and wildlife management. *Preq:* General chemistry sequence.

F N R 466, 666 Stream Ecology 3(2,3) Covers the ecology of flowing water systems. Topics include geomorphology, physical and chemical factors of streams, biology of stream-dwelling organisms, trophic relationships, competition, colonization, drift, community structure, disturbance, and human impacts. *Preq:* Junior standing or consent of department chair.

FNR 470 Creative Inquiry I-3(1-3,0) Multi-semester commitment to participate in forestry and natural resources research with a group of peers, mentored by a faculty member or advanced graduate student. Students learn to collect, analyze, evaluate, and present information. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

FNR 490 Field Training in Natural Resources 3(0,9) Four to eight week internship in which students work in natural resources. Students have supervised management responsibility. Total of 135 hours required. Must be arranged at least two months in advance. To be taken Pass/Fail only. *Preq:* Senior standing in Environmental and Natural Resources, Forestry, or Wildlife and Fisheries Biology, or consent of instructor.

FNR H491 Senior Honors Thesis I 3(3,0) Individual research for students in the Forestry and Natural Resources Honors Program. Focuses on developing a plan of research under the direction of a faculty advisory committee. *Preq:* Senior standing, membership in Calhoun Honors College, and approval of Department of Forestry and Natural Resources.

FNR H492 Senior Honors Thesis II 3(3,0) Individual natural resources research for students in the Forestry and Natural Resources Honors Program. Focuses on data collection, analysis, report writing, and oral presentation. *Preq:* FNR H491.

FNR 499 Natural Resources Seminar 1(1,0) Exploration of current literature and research in natural resources. Students participate in the analysis of research findings, utilizing skills acquired in their undergraduate programs. May be repeated for maximum of two credits.

FRENCH

Professors: C. K. Nakuma, Associate Dean; K. M. Szmulro;
Assistant Professors: J. H. Mai, K. D. Peebles, E. R. Touya;
Lecturers: S. D. Clay, C. Haight, H. G. Newton, A. Sawyer

FR 101 Elementary French 4(3,1) Multimedia course for beginners that combines video, audio, and print to teach the fundamentals of the French language and culture. Emphasizes communicative proficiency (listening comprehension, speaking, reading, and writing).

FR 102 Elementary French 4(3,1) Continuation of FR 101; three hours a week of classroom instruction and one hour a week in the language laboratory.

FR 104 Basic French 4(3,1) Intensive one-semester program combining FR 101 and 102 for students who have previously studied French. Includes fundamentals of grammar and vocabulary as a foundation for building written and oral proficiency.

FR 151 French for Graduate Students 3(3,0) Intensive program only for graduate students preparing for the reading examination in French. A minimum grade of B on a final examination will satisfy graduate school foreign language requirement. May be repeated once for credit. To be taken Pass/Fail only. *Preq:* Graduate standing.

FR 201, H201 Intermediate French 3(3,1) Brief review of FR 101 and 102, with conversation, composition, and dictation, and the beginning of more serious reading of French prose. Includes literary and cultural perspectives. *Preq:* FR 102.

FR 202, H202 Intermediate French 3(3,1) Emphasizes reading nontechnical French prose more rapidly. Writing, speaking, and listening skills continue to be developed. Includes literary and cultural perspectives. *Preq:* FR 201.

FR 297 Creative Inquiry—French 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Arrangements with faculty members must be established prior to registration.

FR 299 Foreign Language Drama Laboratory 1(0,3) Participation in foreign drama productions. No formal class meetings, but an average of three hours per week in a foreign language drama workshop for production. May be repeated for a maximum of three credits. *Preq:* Consent of instructor directing the play.

FR 300 Survey of French Literature 3(3,0) Study of selected masterpieces of French literature in their artistic, cultural, and historical context. May include theme and genre studies. *Preq:* FR 202 or consent of department chair.

FR 304 French Short Story 3(3,0) Introduction to the study of French narrative literature and the elements of critical analysis through the examination of short stories spanning the medieval era to the present from both France and Francophone countries. *Preq:* FR 305 or consent of instructor.

FR 305 Intermediate French Conversation and Composition I 3(3,0) Practice in the spoken language stressing vocabulary building, pronunciation, intonation, and comprehension. Requires written work to increase accuracy and assignments in the language laboratory. *Preq:* FR 202 or consent of department chair.

FR 307 French Civilization 3(3,0) Study of significant aspects of French culture from its origins to the present. *Preq:* FR 305 or consent of instructor.

FR 308 French Linguistics I: Phonetics, Phonology, and Morphology 3(3,0) Study of the fundamental sound patterns, melodic structure, and work-formation processes of modern standard French. *Preq:* FR 304 or 305 or consent of instructor.

FR 309 French Linguistics II: Syntax and Semantics 3(3,0) Study of the fundamental structures of French syntax and semantics. *Preq:* FR 304 or 305 or consent of instructor.

FR 310 CLIP Summer Immersion Program 6(6,0) Conducted entirely in French for eight hours daily, this summer immersion program consists of activities that combine interrelating cultural topics with language skill practice. Frequent opportunities to converse with native speakers during meals and on excursions. Students receive six credits, three of which may be taken in lieu of FR 202. *Preq:* FR 201.

FR 312 Writing in French I 3(3,0) Study of the vocabulary, syntax, and stylistics in short compositions and creative papers in French, on both fiction and non-fiction topics. *Preq:* FR 202 or consent of department chair.

FR 316 French for International Trade I 3(3,0) Spoken and written French common to the French-speaking world of business and industry, emphasizing business practices and writing and translating business letters and professional reports. Cross-cultural references provide opportunity for comparative and contrastive analyses of American and French cultural patterns in a business setting. *Preq:* FR 202, 305 (or concurrent enrollment); or consent of department chair.

FR 317 Contemporary French Civilization 3(3,0) Study of significant aspects of France today; the country, its economy, government, and society. Taught in French. *Preq:* FR 305 or consent of instructor.

FR 320 Studies in French Theatre 3(3,0) Explores a variety of genres (medieval farce, classical comedy and tragedy, romantic melodrama, and the Nouveau Théâtre) with emphasis on staging. Class material consist of scripts, videotaped performances, and theoretical readings on issues pertaining to spectacle in social, political, and artistic terms. May be repeated for a maximum of six credits. *Preq:* FR 202 or consent of department chair.

FR 357 Selected Topics in the Culture of Paris 3(3,0) On-site study of Paris and its relationship to France and Europe through readings, lectures, field trips, small student-group explorations, and reporting sessions. All activities are conducted in French. *Preq:* FR 202 or consent of instructor.

FR 363 French and Francophone Poetry 3(3,0) Study of traditions and major works of French and/or Francophone poetry in their historical, cultural, and aesthetic contexts. Topics may include genres, periods, traditions (romanticism, symbolism, cubism, surrealism), or themes. *Preq:* FR 305.

FR (PO SC) 383 French-Language News 1(1,0) See PO SC 383.

FR H391 Survey of French Literature 1(1,0) One-hour independent study to allow honors students to pursue supervised research on a topic relating to the literary, cultural, and artistic movement in France. *Coreq:* FR 300, membership in Calhoun Honors College.

FR 397 Creative Inquiry—French 1-4(1-4,0) Students focus on a special research area under the guidance of a faculty member. After acquiring the requisite background, students formulate hypotheses for a group project, develop a critical framework, and initiate research on a specific topic.

FR 398 Directed Reading 1-3(1-3,0) Directed study of selected topics in French literature, language, and culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.

FR 400 Modern French Literature 3(3,0) Study of selected works of 20th-century French literature in their artistic, cultural, and historical context. *Preq:* FR 202 or consent of department chair.

FR 409 Writing in French II 3(3,0) Intensive study of syntax and stylistics through composition and translations. *Preq:* Senior standing or consent of department chair.

FR 410 Francophone Literature 3(3,0) Study of selected works of francophone literature emphasizing Africa and the Caribbean in their artistic, cultural, historical, and political contexts. *Preq:* FR 300 or consent of department chair.

FR 411 Advanced French Conversation and Composition 3(3,0) Continuation of FR 305 emphasizing greater fluency and sophistication in oral and written expression. *Preq:* FR 305 or consent of instructor.

FR 412 French and Francophone Cinema 3(2,3) Examination of cinematic practice as a discourse and the role it plays in the representation of social relations, particularly race, ethnicity, class, power, sex, and gender in the French-speaking world. May include a study of major directors, genres, and movements. Taught in French. Films with English subtitles. *Preq:* FR 305 or consent of instructor.

FR 415 Translation Seminar 3(3,0) Methods and theory of translation and a comparison of French and English structures. Practical exercises in translating from French to English and vice versa in a variety of texts. *Preq:* FR 305 or consent of instructor.

FR 416 French for International Trade II 3(3,0) Study of language and cultural environment of the French-speaking markets of the world, including the linguistic and cultural idioms that support global marketing in general and the international marketing of textiles, agricultural products, and tourism in particular. *Preq:* FR 316.

FR 420 French Enlightenment, Revolution and Romanticism 3(3,0) Cultural and literary studies of the century and a half (1715–1851) in which France occupied the center stage of world history and its modern institutions came into being. Emphasizes the free intellectual inquiry championed by philosophers and the romantic melancholy in the aftermath of the Revolution. *Preq:* FR 305 or consent of instructor.

FR H438 French Honors Research 3(3,0) Individual honors research conducted under the direction of Language Department faculty. May not be used to satisfy requirements for the major in Modern Languages–French or Language and International Trade or the minor in Modern Languages. *Preq:* Junior standing and membership in Calhoun Honors College.

FR H439 French Honors Thesis 3(3,0) Individual honors research conducted and thesis completed under the direction of Language Department faculty member. May not be used to satisfy requirements for the major in Modern Languages–French or Language and International Trade or the minor in Modern Languages. *Preq:* Junior standing, FR H438, membership in Calhoun Honors College.

FR 475 Advanced French Seminar 3(3,0) Concentrated research and discussion on an advanced topic in French literature, film, drama, music, or philosophy. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* FR 304 or 305, Senior standing; or consent of instructor.

FR 476 Advanced Seminar on French Thought 3(3,0) Research and discussion of an advanced topic, text, or group of texts with a particular focus on French theory and philosophy but including works of French literature. Conducted in English. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Senior standing or consent of instructor.

FR 477 Advanced Seminar on the French and Francophone Novel 3(3,0) Examination of the French novel and/or narrative prose focusing on a theme, genre, or period. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* FR 304 or 305, Senior standing; or consent of instructor.

FR H491 Modern French Literature 1(1,0) Independent study to allow honors students to pursue in depth an author, work, movement, or genre related to contemporary French culture, art, or literature. *Coreq:* FR 400, membership in Calhoun Honors College.

FR H492 The French Corporation 1(1,0) Independent study to allow honors students to pursue an in-depth study of the organization, structure, functions, and economic role of a French business enterprise. *Coreq:* FR 417, membership in Calhoun Honors College.

FR 497 Creative Inquiry—French I-4(1-4,0) Continuation of research initiated in FR 397. Students complete their projects and disseminate their research results. *Preq:* FR 397 or consent of instructor.

FR 498 Independent Study 1-3(1-3,0) Directed study of a selected topic in French literature, language, or culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.

FR 499, 699 Selected Topics in French Literature 3(3,0) Selected topics that have characterized French literature, language, and culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.

GENETICS

Professors: A. G. Abbott, W. R. Marcotte, K. Murphy, *Chair; Associate Professors:* W. Cao, J. Frugoli, H. Luo, J. Morris, K. S. Smith; *Assistant Professors:* C. F. Chen, L. Clark, F. A. Feltus, H. Kurtz, A. Lawton-Rauh, H. Liang, B. Moore, M. Sehorn, L. J. Wang; *Lecturers:* C. Ingram-Smith, M. T. Morris

GEN 103 Careers in Biochemistry and Genetics 1(1,0) Introduction to biochemistry and genetics career paths, professional organizations, ethical issues, and requirements for advanced study. Also gives students training in design of a professional portfolio. Students may not receive credit for both BIOCH 103 and GEN 103. *Preq:* Freshman or sophomore standing in Biochemistry or Genetics or consent of instructor.

GEN 300 Fundamental Genetics 3(3,0) Introductory course covering fundamental principles of genetics in prokaryotes and eukaryotes. Emphasizes Mendelian genetics, physical and chemical basis of heredity, and population genetics. *Preq:* BIOL 104/106 or consent of instructor.

GEN 301 Fundamental Genetics Laboratory 1(0,3) Experimental and observational approach addressing the concepts presented in GEN 300. Inheritance patterns in a wide variety of eukaryotic and prokaryotic organisms are covered. *Preq:* GEN 300 (or concurrent enrollment).

GEN 302, H302 Molecular and General Genetics 3(3,0) Rapidly-paced course covering Mendelian and molecular genetics, with introductory coverage of quantitative and population genetics. Emphasizes the molecular basis of heredity and gene expression in prokaryotes and eukaryotes and modern genetic technology. *Preq:* BIOL 111 or consent of instructor.

GEN 303 Molecular and General Genetics Laboratory 2(0,4) Laboratory exercises introducing fundamental principles of inheritance in prokaryotes and eukaryotes. *Preq:* GEN 302 or concurrent enrollment.

GEN (BIOSC) 405, H405, 605 Molecular Genetics of Eukaryotes 3(3,0) Molecular genetic analyses of eukaryotes in relation to mutations and repair, complex phenotypes, biochemical pathways, short- and long-term regulation of gene expression, and evolution. *Preq:* GEN 302 or equivalent and one semester of biochemistry, or consent of instructor.

GEN 410, H410, 610 Fundamentals of Genetics I 3(3,0) Classical and computational genetics topics, including Mendelian vs. non-Mendelian inheritance, genetic variation, evolutionary, conservation, coalescent theory, molecular evolution, quantitative trait locus, and association mapping in the framework of population and quantitative genetics. *Preq:* EX ST 301, GEN 302, or consent of instructor.

GEN 411, 611 Fundamentals of Genetics I Laboratory 2(0,4) Crosses are performed using eukaryotic organisms with appropriate markers, and molecular markers are amplified, sequenced, and analyzed. Collected data are used to test hypotheses regarding possible modes of inheritance and for patterns of molecular evolution. Population and molecular evolutionary genetics concepts are also examined. *Preq:* GEN 410 or concurrent enrollment, or consent of instructor.

GEN (BIOSC) 416, 616 Recombinant DNA 3(3,0) Familiarizes students with the most current facts and concepts of molecular genetics. Lectures focus on gene organization, structure, and expression in prokaryotes and eukaryotes, highlighting current technologies and research in these areas. *Preq:* GEN 302 or equivalent and one semester of biochemistry or consent of instructor. A developmental biology course is also strongly recommended.

GEN (BIOSC, MICRO) 418, 618 Biotechnology I: Nucleic Acids Techniques 4(2,4) Basic training in the manipulation of genetic information using recombinant DNA technology. Includes techniques in molecular cloning, Southern and Northern analyses, clone library construction. *Preq:* BIOCH 301 or 305, MICRO 305 or consent of instructor.

GEN 420, H420, 620 Fundamentals of Genetics II 3(3,0) Molecular genetics, including replication, transcription and translation, gene expression, recombinant DNA technology, developmental, human, cancer, and behavioral genetics. *Preq:* BIOCH 301 or concurrent enrollment, GEN 302, or consent of instructor.

GEN 421 Fundamentals of Genetics II Laboratory 2(0,4) Explores molecular genetics techniques (transformation, cloning, PCR, gel electrophoresis, Southern Blotting, reporter genes, gene mapping) using prokaryotic and eukaryotic organisms. *Preq:* GEN 420 or concurrent enrollment, or consent of instructor.

GEN (BIOCH) 440, H440, 640 Bioinformatics 3(3,0) Theory and application of computational technology to analysis of the genome, transcriptome, and proteome. *Preq:* CP SC 120 (or equivalent), GEN 302, 410, or consent of instructor.

GEN 450, H450, 650 Comparative Genetics 3(3,0) Outlines the genome structure, function, and evolution based on available complete genome sequences. Topics include the evolution of multigene families, origin of eukaryotic organelles, molecular phylogeny, gene duplication, domain shuffling, transposition, and horizontal gene transfer. *Preq:* GEN 420, 440 or consent of instructor.

GEN (BIOSC, HORT) 465, 665 Plant Molecular Biology 3(3,0) See HORT 465.

GEN 470, 670 Human Genetics 3(3,0) Basic principles of inheritance; population, molecular and biochemical genetics; cytogenetics; immunogenetics; complex traits; cancer genetics; treatment of genetic disorders; genetic screening and counseling; and the Human Genome Project. *Preq:* GEN 302 or consent of instructor.

GEN 490 Selected Topics in Genetics 1-4(0-4,0-9) Comprehensive study of selected topics not covered in other courses. May be repeated for a maximum of eight credits, but only if different topics are covered. *Preq:* Junior standing or consent of instructor.

GEN 491, H491 Directed Research in Genetics 1-8(0,3-24) Orientation in genetic research (i.e. experimental planning, execution, and reporting). May be repeated for a maximum of eight credits. *Preq:* GEN 410, 411, 420, 421 or consent of instructor.

GEN 493, H493 Senior Seminar 2(2,0) Analysis and discussion of papers from the primary literature in the life sciences particularly in genetics. Students find pertinent articles in the primary literature and present and analyze the selected reading.

GEN (ENT) 495, 695 Insect Biotechnology 3(3,0) See ENT 495.

GEOGRAPHY

Associate Professors: J. A. Miller, C. A. Smith; *Lecturer:* L. F. Howard

GEOG 101 Introduction to Geography 3(3,0) Survey of the nature of geography emphasizing the discipline's organizing themes of earth science, relations between people and their environments, interrelations between places, locational analysis, and area studies.

GEOG 103 World Regional Geography 3(3,0) Systematic and descriptive survey of the major regions of the world, including their physical and cultural features. Provides a global context for courses in the social sciences and humanities.

GEOG 106 Geography of the Physical Environment 4(3,3) Examines the condition of the physical environment, especially the earth's surface and the processes that act on it. Topics range from earth-sun relations to the evolution of landscapes; human habitats and human alteration of the environment.

GEOG 301 Political Geography 3(3,0) Geographic basis of states: sovereignty, territory, power within states, relations between states. The geography of international affairs. *Preq:* GEOG 101 or 103 or consent of instructor.

GEOG 302 Economic Geography 3(3,0) Spatial analysis of economic activity emphasizing regional economics and development. Topics include world population; technology and economic development; principles of spatial interaction; and geography of agriculture, energy manufacturing, and tertiary activities. *Preq:* GEOG 101 or 103 or consent of instructor.

GEOG 303 Urban Geography 3(3,0) Historical and contemporary survey of the urban world, with particular attention paid to the relationship between people and urban places. Topics include the rise of cities, urban hierarchies, urban land use, and the social geography of cities. *Preq:* GEOG 101 or 103 or consent of instructor.

GEOG 305 Cultural Geography 3(3,0) Broad examination of the basic cultural variables in the human occupation of the earth using ecological, spatial, regional, and historical approaches. Topics vary but may include cultural areas and distributions, cultural change, cultural landscape, and cultural ecology. *Preq:* GEOG 101 or 103 or consent of instructor.

GEOG 306 Historical Geography 3(3,0) Exploration of geographical change and the varied patterns of past human activities and people's relationships with the physical environment. Case studies from around the world are used to emphasize key themes in historical geography. *Preq:* GEOG 101 or 103 or consent of instructor.

GEOG 330 Geography of the Middle East and North Africa 3(3,0) Thematic survey of a world region extending from Morocco to Afghanistan. Emphasizes climate, environment, social geography, historical development of the regional culture of Islam, and common problems facing the area today. *Preq:* GEOG 101 or 103, or consent of instructor.

GEOG 340 Geography of Latin America 3(3,0) Introduction to the physical, economic, political, and human/cultural geography of Latin America. Special focus is on regional unity and diversity and the historical interaction of man and environment.

GEOG 360 Geography of Africa 3(3,0) Study of how tropical, or sub-Saharan, Africa functions in the modern world. Africa's physical environments, peoples and cultures, colonial and post-colonial history, and ideologies of economic development. Five basic themes are covered: population, natural resources, environmental quality, political organization, economic development. *Preq:* GEOG 101 or 103 or consent of instructor.

GEOG 399 Creative Inquiry—Geography 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of nine credits. *Preq:* GEOG 101, 103, or consent of instructor.

GEOG 401, 601 Studies in Geography 3(3,0) Intensive study of the geography of a selected world region, such as North America, Europe, or the Middle East, or the geography of a topic, such as the geography of oil or the geography of underdevelopment. May be repeated once for credit with departmental consent. *Preq:* GEOG 101 or 103 or consent of instructor.

GEOG 410, 610 Geography of the American South 3(3,0) Study of the geography of the American South in its changing complexities across almost 400 years of development. *Preq:* GEOG 101 or 103 or consent of instructor.

GEOG 420, 620 Historical Geography of the United States 3(3,0) Survey that places the spatial concepts of geography into a time sequence with special emphasis upon the United States. *Preq:* GEOG 101 or 103 or consent of instructor.

GEOG (PRTM) 430, 630 World Geography of Parks and Equivalent Reserves 3(3,0) See PRTM 430.

GEOG 440, 640 Geography of Historic Preservation 3(3,0) Aspects of historic preservation emphasizing sites and structures in their geographical, historical, and socioeconomic contexts. Examples are drawn from American architectural styles and settlement forms. *Preq:* GEOG 101 or 103 or consent of instructor.

GEOG 499 Independent Study in Geography 3(3,0) Study of selected topics in geography under the direction of a faculty member chosen by the student. Student and faculty member develop a course of study designed for the individual student and approved by the department chair prior to registration.

GEOLOGY

Professors: J. W. Castle, A. W. Elzerman, R. W. Falta Jr., C. M. Lee, L. C. Murdoch, J. R. Wagner, R. D. Warner; *Associate Professors:* E. R. Carraway, M. A. Schlautman; *Assistant Professors:* T. A. Kendall, S. M. Moysey; *Lecturers:* W. G. Dean, L. B. Krause

GEOL 100 Current Topics in Geology 1(1,0) Lectures and demonstrations covering topics of current interest in the different fields of geology. Recent research developments and career opportunities in the geosciences are emphasized.

GEOL 101, H101 Physical Geology 3(3,0) Study of the minerals and rocks that compose earth's crust, their origins and transformations. Emphasizes geological processes, both internal and external, by which changes are produced on or in the earth.

GEOL 102, H102 Earth History 4(3,3) Survey of the earth's geologic history emphasizing how the continents and ocean basins have evolved through geologic time. Evolution of life from the beginning of the fossil record through the present; identification of fossil plants and animals and interpretation of earth's past through study of geologic maps. Field trips illustrate principles. *Preq:* GEOL 101, 103.

GEOL 103, H103 Physical Geology Laboratory 1(0,2) Laboratory to accompany GEOL 101. Provides instruction in the identification of minerals and rocks and in the interpretation of geologic processes through study of topographic maps. Field trips provide direct observation of processes and results. *Coreq:* GEOL 101.

GEOL 112 Earth Resources 3(3,0) Survey of earth's mineral, energy, water, and land resources and environmental and societal impacts associated with the use of these resources. *Preq:* GEOL 101.

GEOL 114 Earth Resources Laboratory 1(0,2) Laboratory to accompany GEOL 112. Provides instruction in the identification of ore and gem minerals and of other earth materials of economic importance. Land and water resources are explored through the use of topographic maps, aerial photographs, remotely sensed images, and field trips. *Preq:* GEOL 103. *Coreq:* GEOL 112.

GEOL 205 Mineralogy and Introductory Petrology 3(3,0) Includes crystal symmetry and introduction to x-ray crystallography, composition and stability of minerals, survey of common rock-forming minerals, petrological classification of rocks and introduction to rock associations. *Preq:* GEOL 101, 103, or consent of instructor.

GEOL 207 Mineralogy and Introductory Petrology Laboratory 1(0,3) Identification of rock-forming minerals and important ore minerals based on their physical properties. Includes hand specimen petrology of igneous, sedimentary, and metamorphic rocks. Credit toward a degree will be given for only one of GEOL 207 or 208. *Coreq:* GEOL 205.

GEOL 208 Mineralogy and Petrography Laboratory 2(0,6) Identification of rock-forming minerals and important ore minerals based on their physical and optical properties. Hand specimen petrology and petrography of igneous, sedimentary, and metamorphic rocks. Study of minerals in thin section using polarizing microscope. Credit toward a degree will be given for only one of GEOL 207 or 208. *Coreq:* GEOL 205.

GEOL 210 Geology of the National Parks 3(3,0) Survey of selected national parks and monuments emphasizing the dynamic geological processes that have shaped the landscapes of these areas. Special attention is focused on parks exhibiting recent geological activity related to volcanoes, earthquakes, and glaciers. Slides and films are used to highlight specific geological features.

GEOL 211 Geoanalysis I 4(3,3) Students develop a working knowledge of statistical methods used to formulate and solve problems in the earth sciences. Emphasis is on sampling methods and experimental design for geologic settings and on formulating and evaluating hypotheses using statistical inference of data sets. *Preq:* MTHSC 108.

GEOL 212 Geoanalysis II 4(3,3) Students develop a working knowledge of deterministic methods used to formulate and solve problems in the earth sciences. Emphasis is on developing conceptual models from geologic field observations, formulating idealized problems, and analyzing and interpreting solutions. Special focus is on using computer software to support analyses. *Preq:* GEOL 211, MTHSC 108.

GEOL (ASTR) 220 Planetary Science 3(3,0) Survey of the formation and evolution of planetary bodies. Emphasizes the origin of planetary material and comparative study of the primary processes operative on planetary surfaces. Describes major features of the planets and moons in our solar system, as revealed by recent space missions.

GEOL 270 Experiences in Sustainable Development: Water 3(3,0) Integrates cross-disciplinary perspectives on sustainability through active student participation in real-world development projects. Focuses on identifying and overcoming environmental, technical, social/organizational, and economic barriers to the sustainability of water resources. Emphasizes small-scale international water resources development.

GEOL 291 Introduction to Research I 1(1,0) Required group learning and research experience for Geology majors (open to others with consent of instructor). Introduction to problem solving through case studies and interdisciplinary team approaches. Focus is on, but not limited to, research approaches in geology. Social and ethical contexts, communication skills, and professional development are incorporated.

GEOL 292 Introduction to Research II 1(1,0) Required group learning and research experience for Geology majors (open to others with consent of instructor). Introduction to problem solving through case studies and interdisciplinary team approaches. Focus is on, but not limited to, research approaches in geology. Social and ethical contexts, communication skills, and professional development are incorporated. *Preq:* GEOL 291 or consent of instructor.

GEOL 300, H300 Environmental Geology 3(3,0) Discussion-oriented introduction to relationships of man to his physical surroundings and problems resulting from upsetting the established equilibria of geologic systems; man's role as a geologic agent, environmental conservation and management. *Preq:* GEOL 101 or consent of instructor.

GEOL 302, H302 Structural Geology 4(3,3) Diverse geological structures of the earth, their description, origin, and field recognition. Practical problems in interpreting geologic structures are utilized, in addition to theoretical considerations of the mechanics and causes of tectonism. *Preq:* GEOL 102 or consent of instructor.

GEOL 313 Sedimentology and Stratigraphy 4(3,3) Topics include origin, composition, and texture of sediments and sedimentary rocks; sedimentation processes, depositional environments, facies relationships, and diagenesis; introduction to stratigraphic methods and geochronology. Laboratory involves description and classification of hand specimens and thin sections and analytical methods. *Preq:* GEOL 206 or consent of instructor.

GEOL 314, H314 Sedimentary Petrology 3(2,3) Origin, composition, and texture of sediments and sedimentary rocks, including both siliciclastic and chemical varieties. Interpretation of tectonic settings, depositional systems, facies relationships, and diagenesis. Laboratory involves description and classification of hand specimens and thin sections and analytical methods. *Preq:* GEOL 206 or consent of instructor.

GEOL 316, H316 Igneous and Metamorphic Petrology 3(2,3) Classification, occurrence, and origin of igneous and metamorphic rocks. Discussion of the chemical and physical processes involved in magmatic crystallization and metamorphism. Laboratory study of igneous and metamorphic rocks in hand specimen and thin section. *Preq:* GEOL 206, 216 or consent of instructor.

GEOL 318 Introduction to Geochemistry 3(3,0) Introduction to distribution of elements in the core, mantle, and crust of the earth. Control of rock type on trace element content in soils and sediments. Weathering; soil and regolith formation; water-sediment interrelations; solubility, mobility and bioavailability in relation to redox, pH and complexation; biogeochemical cycles of selected elements. *Preq:* GEOL 101 and C11 102 or consent of instructor.

GEOL 370 Western United States Field Study 3(1,4) Field excursion to a geologic region in the western U.S. Students spend one week visiting sites where the stratigraphy and structure are well exposed, studying a variety of landforms and the geologic processes responsible for their formation. Pre- and post-trip sessions are held on campus. Additional fees are required. *Preq:* GEOL 101 or consent of instructor.

GEOL 375, H375 Bahamian Field Study 3(1,4) Students develop an understanding of Bahamian geology, culture, and social structure (including the influences of historical context and natural environments). Students stay one week on Andros Island in the Bahamas, traveling by van and boat to various sites. Additional fees are required. *Preq:* GEOL 101 or consent of instructor.

GEOL 391 Research Methods I 2(2,0) Required group learning and research experience for Geology majors (open to others with consent of instructor). Introduction to problem solving through case studies and interdisciplinary team approaches. Focus is on, but not limited to, research methods in geology. Social and ethical contexts, communication skills, and professional development are incorporated. *Preq:* GEOL 292 or consent of instructor.

GEOL 392 Research Methods II 2(2,0) Required group learning and research experience for Geology majors (open to others with consent of instructor). Introduction to problem solving through case studies and interdisciplinary team approaches. Focus is on, but not limited to, research methods in geology. Social and ethical contexts, communication skills, and professional development are incorporated. *Preq:* GEOL 391 or consent of instructor.

GEOL 403, 603 Invertebrate Paleontology 3(2,3) Study of life of past geologic ages as shown by fossilized remains of ancient animals, with emphasis on the invertebrates. *Preq:* GEOL 101 or consent of instructor.

GEOL 405, 605 Surficial Geology 4(3,3) Study of surface features of the earth and the processes that produce them. Analysis of landforms including their form, nature, origin, development, and rates and patterns of change. Laboratory studies emphasize terrain analysis and the mechanics of surficial geological processes. *Preq:* GEOL 102, 300, or consent of instructor.

GEOL H408, 608 Geohydrology 3(3,0) Study of the hydrologic cycle, aquifer characteristics, theory of groundwater movement, mechanics of well flow, experimental methods, and subsurface mapping. *Preq:* GEOL 101, 102.

GEOL 409 Subsurface Methods 4(3,3) Students develop an understanding of the principles and methods used to acquire, analyze, and interpret subsurface geological data. Emphasizes borehole measurements; seismic gravimetric, magnetic, and electrical methods; and their applications to hydrogeology, remediation, and oil and gas exploration. *Preq:* GEOL 313.

GEOL 411, H411 Research Problems 1-3(0,3-9) Field, laboratory, or library study of an approved topic in geology. Topic would be one not normally covered in formal courses, but may be an extension of a course. Taught either semester. May be repeated for a maximum of six credits. *Preq:* Senior standing or consent of instructor.

GEOL 413, 613 Stratigraphy 3(2,2) Analysis of stratified rocks as the repository of earth history and the conceptual framework used to synthesize the world geologic record as a coherent whole. Emphasizes not only traditional lithostratigraphy but also modern seismic stratigraphy, biostratigraphy, magnetostratigraphy, and current stratigraphic issues. *Preq:* GEOL 314 or consent of instructor.

GEOL 415 Analysis of Geological Processes 3(3,0) Introduction to methods for analyzing geological processes. Mathematical methods are introduced to solve problems related to stream flow, reaction kinetics, radioactive decay, heat flow, diffusion, fluid flow through geologic media and related processes. *Preq* or *Coreq:* MTHSC 206 or consent of instructor.

GEOL 421, 621 GIS Applications in Geology 3(1,4) Introduction to geographic information systems with applications to current geological and hydrological problems. Topics include the use of global positioning systems, spatial analysis, and image analysis. Hands-on training with geographic information systems software and techniques is covered in lab. *Preq:* Senior standing, strong computer skills.

GEOL 451, 651 Selected Topics in Hydrogeology 1-4(1-3,0-3) Selected topics in hydrogeology emphasizing new developments in the field. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* GEOL 300 or 408, or consent of instructor.

GEOL 459, 659 Biogeochemistry 3(3,0) Examines how biology directs mass and energy transfer between the lithosphere, biosphere, hydrosphere, and atmosphere. Scale of examination ranges from molecular to global. Topics include element cycling, the mineral-microbe/plant interface, biomineralization, and biogeochemical applications to bioremediation, ecology, environmental toxicology, and biotechnology. *Preq:* CH 102 or GEOL 318 or consent of instructor.

GEOL 475 Summer Geology Field Camp 6(4,6) Introduction to field techniques emphasizing methods applied to hydrogeology. Includes description and mapping of hydrogeologic units and structures using outcrop data and lithologic and geophysical well logs. Also covers construction of potentiometric maps from water level data, performance of pumping tests on mapped aquifers, and analysis of data to determine aquifer characteristics. *Preq:* GEOL 205 and 302, or consent of instructor.

GEOL (CSENV, ENT0X) 485, 685 Environmental Soil Chemistry 3(3,0) See CSENV 485.

GEOL 491 Research Synthesis I 3(2,3) Required capstone group learning and research experience for Geology majors (open to others with consent of instructor). Involves synthesis of applied geology and other approaches for problem solving through collaborative teams. Course is the culmination of a sequence of case studies incorporating social and ethical contexts, communication skills, and professional development. *Preq:* GEOL 392 or consent of instructor.

GEOL 492 Research Synthesis II 3(2,3) Required capstone group learning and research experience for Geology majors (open to others with consent of instructor). Involves synthesis of applied geology and other approaches for problem solving through collaborative teams. Course is the culmination of a sequence of case studies incorporating social and ethical contexts, communication skills, and professional development. *Preq:* GEOL 491 or consent of instructor.

GERMAN

Associate Professors: G. J. Love, J. Schmidt; *Assistant Professor:* S. Fredrick; *Lecturers:* L. J. Ferrell, J. T. Littlejohn

GER 101 Elementary German 4(3,1) Course for beginners in which, through conversation, composition, and dictation, the fundamentals of the language are taught and a foundation is provided for further study and the eventual ability to read and speak the language. Three hours a week of classroom instruction and one hour a week in the language laboratory.

GER 102 Elementary German 4(3,1) Continuation of GER 101; three hours a week of classroom instruction and one hour a week in the language laboratory.

GER 104 Basic German 4(3,1) Intensive one-semester program combining GER 101 and 102 for students who have previously studied German. Includes fundamentals of grammar and vocabulary as a foundation for written and oral proficiency.

GER 151 German for Graduate Students 3(3,0) Intensive program only for graduate students preparing for the reading examination in German. A minimum grade of B on a final examination will satisfy graduate school foreign language requirement. May be repeated once for credit. To be taken Pass/Fail only. *Preq:* Graduate standing.

GER 201, H201 Intermediate German 3(3,1) Brief review of GER 101 and 102, with conversation, composition, and dictation, and the reading of more serious German prose in short stories and plays. Includes literary and cultural perspectives. *Preq:* GER 102.

GER 202, H202 Intermediate German 3(3,1) Emphasizes reading nontechnical German prose more rapidly. Writing, speaking, and listening skills continue to be developed. Includes literary and cultural perspectives. *Preq:* GER 201 or consent of instructor.

GER 260 Selected Topics in German Literature 3(3,0) Study of significant aspects of German literature. Conducted in English.

GER 297 Creative Inquiry—German 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Arrangements with faculty members must be established prior to registration.

GER 299 Foreign Language Drama Laboratory 1(0,3) Participation in foreign language drama productions. No formal class meetings, but an average of three hours per week in a foreign language drama workshop for production. May be repeated for a maximum of three credits. *Preq:* Consent of instructor directing the play.

GER 305 German Conversation and Composition 3(3,0) Training in spoken and written German emphasizing vocabulary acquisition, oral and written communication strategies, appropriate linguistic formulations for specific cultural contexts, and stylistics. *Preq:* GER 202 or consent of instructor.

GER 306 The German Short Story 3(3,0) Examines the Austrian, German, and Swiss short story as a distinct literary genre that flourished particularly after 1945. Provides ample conversation and composition practice, as well as an introduction to principles of literary prose analysis. *Preq:* GER 202 or consent of instructor.

GER 310 Summer Immersion Program 6(6,0) Conducted entirely in German for eight hours daily. Program consists of activities that combine interrelating cultural topics with language skill practice. Frequent opportunities to converse with native speakers during meals and on excursions. Students receive six credits, three of which may be taken in lieu of GER 202. *Preq:* GER 201.

GER 316 German for International Trade 1 3(3,0) Spoken and written German common to the German-speaking world of business and industry emphasizing business practices and writing and translating business letters and professional reports. Cross-cultural references provide opportunity for comparative and contrastive analysis of American and German cultural patterns in a business setting. *Preq:* GER 202 and 305 (or concurrent enrollment); or consent of department chair.

GER 340 German Culture 3(3,0) Examines the cultures of German-speaking nations from their origins to the present. Emphasizes the Federal Republic of Germany both before and after the German unification of 1990. *Preq:* GER 202 or consent of instructor.

GER 360 German Literature to 1832 3(3,0) Examines selected topics in German literature from the Middle Ages to 1832. Readings may include works by Lessing, Goethe, Schiller, and the Romantics. *Preq:* GER 305 or 306 (or concurrent enrollment) or consent of instructor.

GER 361 German Literature from 1832 to Modernism 3(3,0) Examines drama, poetry, and prose from the Biedermeier period through naturalism and realism to the advent of modernism. *Preq:* GER 305 or 306 or consent of instructor.

GER 369 Special Topics in German Literature 3(3,0) Study of a significant aspect of German literature. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* GER 305 or 306 or consent of instructor.

GER 397 Creative Inquiry—German 1-4(1-4,0) Students focus on a special research area under the guidance of a faculty member. After acquiring the requisite background, students formulate hypotheses for a group project, develop a critical framework, and initiate research on a specific topic.

GER 398 Directed Reading 1-3(1-3,0) Directed study of selected topics in German literature, language, and culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.

GER 405 Advanced Contemporary German Language 3(3,0) Advanced study of spoken and written contemporary German based on modern autobiographical texts, eyewitness accounts of recent historical events, and media coverage of current events. Employs Internet, print and audio texts, TV programs, and photo series. *Preq:* One 300-level German course or consent of instructor.

GER 416 German for International Trade II 3(3,0) Study of language and cultural environment of the German-speaking markets of the world, including linguistic and cultural idioms that support global marketing in general and the international marketing of textiles, agricultural products, and tourism in particular. *Preq:* GER 316.

GER 417 Topics in German for International Trade 3(3,0) Examination and analysis of selected topics related to the business culture and economy of Germany, Austria, Switzerland, the European Union, or the European Free Trade Association. Topics may include the reconstruction of Eastern Germany's economy, the expansion of the European Union, or current events of economic importance. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* One 300-level German course or consent of department chair.

GER 450 Advanced Studies in German Drama 3(3,0) Extensive study of a major theme or aspect of German drama. May include recorded live performances, stage design, theatre architecture, and the music and art of the theatre. *Preq:* GER 305 or 306 or consent of instructor.

GER 455 German Film 3(2,3) Overview of German cinema including the expressionist classics of the Weimar Republic, entertainment and documentary movies of the Nazi era, classics of the postwar New German Wave (West Germany), distinctive East German films, and vanguard contemporary films. *Preq:* GER 305 or 306 or consent of instructor.

GER 460 Modernism in German Literature 3(3,0) Study of major works of German literature and culture in the modernist era (1888–1933). May include drama, music, philosophy, and the plastic arts. *Preq:* GER 305 or 306 or consent of instructor.

GER 461 German Literature Since 1933 3(3,0) Study of selected authors, texts, or genres in contemporary German literature. *Preq:* GER 305 or 306 or consent of instructor.

GER 475 Advanced German Seminar 3(3,0) Concentrated research and discussion on advanced topics, works, or texts in German literature, film, art, drama, music, or philosophy. Conducted in German. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* One 400-level German course or consent of instructor.

GER 476 Advanced Seminar in German Thought 3(3,0) Concentrated research and discussion on advanced topics, works or texts in German literature, film, art, drama, music or philosophy. Conducted in English. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Senior standing or consent of instructor.

GER 497 Creative Inquiry—German 1-4(1-4,0) Continuation of research initiated in GER 397. Students complete their project and disseminate their research results. *Preq:* GER 397 or consent of instructor.

GER 498, 698 Independent Study 1-3(1-3,0) Supervised study of selected topics in German literature, language, or culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.

GRAPHIC COMMUNICATIONS

Professors: S. T. Ingram, Chair; J. M. Leininger; *Associate Professors:* J. B. Simmons, E. M. Weisenmiller; *Assistant Professors:* L. H. O'Hara, N. L. Woolbright; *Research Assistant Professor:* C. E. Tonkin; *Senior Lecturers:* N. W. Leininger, P. G. Rose; *Lecturers:* K. T. Cox, C. D. Jones, R. N. Marsoun, J. K. Sperry, M. H. Wayne, D. N. Woolbright; *Visiting Professors:* J. P. Crouch, F. T. Simon, W. E. West; *Adjunct Professors:* S. Edlein, L. W. Evans; *Visiting Lecturers:* R. S. Edlein, K. K. Osborne; *Adjunct Lecturer:* F. C. Porcher

G C 101 Orientation to Graphic Communications 1(1,0) Introduction to the curriculum and the industry, including its processes, products, and careers. Emphasizes the attributes most desirable for successful entry and advancement up a variety of career ladders.

G C 102 Computer Art and CAD Foundations 4(2,6) Graphic Communications industries make extensive use of software and best practices from concept through production. This course provides a solid foundation in drawing, imaging and layout software; packaging structure and 3-D CAD; design principles and problem solving relative to audience, need, typography, color, materials, printing and end use.

G C 103 Graphic Communications I for Packaging Science 4(2,6) Emphasizes the interrelationships of packaging and graphic arts. Topics include theory and practice in packaging requirements relative to basic graphic arts concepts, principles, and practices; layout; design; electronic copy preparation; the printing processes of offset lithography; screen printing; gravure; and flexography. Includes digital and specialty printing processes, environmental, health, and safety concerns.

G C 104, H104 Graphic Communications I 4(2,6) Emphasizes basic graphic arts industrial concepts, principles, and practices, with laboratory applications in photography, layout and design, conventional and electronic copy preparation, reproduction photography, offset lithography, screen printing, and finishing operations. Covers flexography, gravure, letterpress, and specialty printing processes, along with environmental, health, and safety concerns.

G C 199 Creative Inquiry—Graphic Communications I 1-3(1-3,0) Under the direction of a faculty member, students pursue approved scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits. *Preq:* Freshman standing.

G C 207, H207 Graphic Communications II 4(2,6) Continuation of G C 104. Intermediate course for graphic communications and graphic arts specialists which broadens skills and technical knowledge in areas of layout, copy preparation, reproduction photography, film assembly, screen printing, lithographic presswork, and finishing. *Preq:* G C 101, 102, 104, typewriter/computer keyboarding skills of 20 net words per minute.

G C 215, H215 Photographic and Digital Imaging Techniques 3(1,6) Emphasizes application of black and white and color imaging by photographic and digital technologies. Laboratory experiences assure confidence in the use of photographic and digital techniques for creating and enhancing original images for graphic reproduction and distribution.

G C 299 Creative Inquiry—Graphic Communications II 1-3(1-3,0) Under the direction of a faculty member, students pursue approved scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits. *Preq:* Sophomore standing.

G C 310, H310 Applied Principles of Electronic Workflow 4(2,6) Promotes the refining of skills learned in G C 104 and 207, with an in-depth study and application of computerized prepress systems and methodologies. Serves as a transition course to the advanced graphic classes teaching offset lithography, flexography, screen printing, and gravure. *Preq:* G C 207, 215, or consent of instructor.

G C 340 Digital Imaging and eMedia 4(2,6) Course centers around digital camera capture and control, and provides students with experience, techniques and processing options for creating interactive, integrated eMedia. Coursework includes commercial photography, color profiling, digital asset management, personalized cross-media campaigns, Web design and podcasts. *Preq:* G C 102 and 104.

G C 350 Graphic Communications Internship I 1(0,3) Full-time supervised employment in an industrial in-plant setting for expansion of experience with materials and processes, production people, and organizations. Restricted to Graphic Communications majors. *Preq:* G C 104 or equivalent, consent of instructor. *Coreq:* CO-OP 101.

G C 399 Creative Inquiry—Graphic Communications III 1-3(1-3,0) Under the direction of a faculty member, students pursue approved scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits. *Preq:* Junior standing.

G C 406, H406, 606 Package and Specialty Printing 4(2,6) In-depth study of the problems and processes for printing and converting in package label and specialty printing industries. Flexographic preparation, printing, die making, diecutting, printing screen, container printing, pad printing and bar code production are covered. New developments and trends are discussed. Laboratory in techniques includes printing and converting. *Preq:* G C 310 or 340; or consent of instructor.

G C 407, 607 Advanced Flexographic Methods 4(2,6) In-depth study of the methods used in flexographic printing and converting of porous and nonporous substrates. Theory and laboratory applications include setting standards for process color, preparation of plate systems, ink mixing and color matching, testing of films and foils, analysis of recent developments, and prediction of future markets. *Preq:* G C 406 or consent of instructor.

G C 440, H440, 640 Commercial Printing 4(2,6) Advances skills learned in previous graphic communications courses and applies the knowledge to large format presses. Students work from the design conception stage through all aspects of preparation, production, and finishing. Emphasizes understanding and incorporating emerging technologies into the production workflow. *Preq:* G C 310 and 350 or consent of instructor.

G C 444, H444, 644 Current Developments and Trends in Graphic Communications 4(2,6) Advanced course for Graphic Communications majors. Emphasizes the theory and technical developments that affect process and equipment selection. Topics include color theory and application, electronic color scanning, electronic prepress and communications, gravure color quality control and analysis. *Preq:* G C 405, 406, 440.

G C 445, 645 Advanced Screen Printing Methods 3(2,3) In-depth study of the systems and materials used with the screen printing process. Emphasizes techniques of control and procedures for establishing screen printing methods and standards. *Preq:* G C 207 or consent of instructor.

G C 446, 646 Ink and Substrates 3(2,3) Covers components, manufacturing, process use as well as end use of ink and substrates used in lithography, flexography, gravure, and screen printing. Examines the interrelationship between inks, substrates, and the printing process. Through controlled testing and examination, optimum conditions for improved printability are determined. *Preq:* G C 405; 406 or 440; or consent of instructor.

G C 448, H448, 648 Planning and Controlling Printing Functions 3(2,3) Study of systems for setting printing production standards, estimating, scheduling, job planning, and the selection of new hardware and technologies. *Preq:* G C 350, 405, 406, 440, 450 or consent of instructor.

G C 450 Graphic Communications Internship II 1(0,3) Continuation of G C 350. *Preq:* G C 350, 405; 406 or 440; consent of instructor. *Coreq:* CO-OP 102.

G C 451, H451 Special Projects in Graphic Communications 1-6(0,3-18) Advanced projects covering theory and/or practices going beyond the scope of regular coursework. Written project approval is required before registering. May be repeated with advisor's approval. *Preq:* Junior standing, completion of three graphic communications courses, or consent of instructor.

G C 455 Advanced Graphic Communications Internship 1(0,3) Full-time employment in an industry directly or indirectly related to printing. Work site and job must be approved in advance. *Preq:* G C 350.

G C 480 Senior Seminar in Graphic Communications 2(2,0) Study of current trends and issues in the graphic communications industry. Class centers around group discussions dealing with relevant topics facing the graphic communications manager today. Students draw upon academic experiences, internship experiences, and library research to facilitate discussion. Must be taken during student's last semester on campus. *Preq:* G C 450.

G C 490, 690 Graphic Communications Selected Topics 1-3(1-3,0) Subjects not covered in other graphic communications courses; organized according to industry trends and student needs. May be repeated for a maximum of 18 credits, but only if different topics are covered. *Preq:* Consent of instructor.

G C 499 Creative Inquiry—Graphic Communications IV 1-3(1-3,0) Under the direction of a faculty member, students pursue approved scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits. *Preq:* Senior standing.

GREAT WORKS

G W (ENGL) 301, H301 Great Books of the Western World 3(3,0) Introduces Great Works minor. Includes readings about the Great Books concept, as well as various great books from the humanities, arts, and natural and social sciences. *Preq:* Sophomore literature.

G W 402, H402 Great Works of Science 3(3,0) Understanding of science in terms of its history and its approach to problem-solving through study of selected great works. Emphasis is on developing students' abilities to reflect on the problems and methodologies encountered in the scientific method.

G W 403, H403 Special Topics in Continental Literature 3(3,0) Important primary texts written in modern European languages are taught in English. Content varies according to instructor. *Preq:* Sophomore literature.

G W 405, H405 The Darwinian Revolution 3(3,0) Examination of Charles Darwin's *The Origin of Species* and its cultural impact from his time to ours. Topics include the contemporaneous reception of Darwin's work, the Scopes Monkey Trial, and more recent controversies over Creationism and Intelligent Design. *Preq:* Sophomore literature.

HEALTH

Professors: L. A. Crandall, *Chair*; C. J. Dye, D. B. Jackson, J. B. Kingree; *Research Professor:* M. P. Thompson; *Associate Professors:* G. E. Costello, K. A. Kemper, R. M. Mayo, W. W. Sherrill, H. D. Spitler; *Assistant Professors:* G. Breeden, D. A. Falta, S. F. Griffin, K. D. Truong, J. E. Williams; *Senior Lecturer:* K. M. Meyer, *Lecturers:* C. S. Chambers, R. S. Welsh; *Adjunct Professors:* G. L. Adams, B. F. Campbell, V. S. Gallicchio, W. J. Jones, M. C. Riordan, S. Verderber; *Adjunct Lecturer:* D. M. Charles

HLTH 202 Introduction to Public Health 3(3,0) Examination of the forces that have influenced current health delivery systems, health practices, and trends. General systems theory is introduced. Health majors and minors will be given enrollment priority.

HLTH 203 Overview of Health Care Systems 3(3,0) Introduction to the health care delivery system including public health and health care components. Examines and discusses individual and public expectations of need and demand for health care and delivery of public health and health care services.

HLTH 240 Determinants of Health Behavior 3(3,0) Analysis of health behaviors based on psychological, social, cultural, and environmental factors. Introduces health behavior theories. *Preq:* Health Science major, HLTH 202 or 298.

HLTH 250 Health and Fitness 3(3,0) Study of interrelationship between health and fitness. Emphasizes the cardiovascular system and benefits of exercise.

HLTH 298 Human Health and Disease 3(3,0) Study of good health practices emphasizing lifestyles and measures of health. Health majors and minors will be given enrollment priority.

HLTH 303 Public Health Communication 3(3,0) Introduction to the use of health and communication theory and social marketing strategies to create effective, evidence-based, culturally appropriate health communication messages and campaigns. *Preq:* HLTH 240, 298.

HLTH 305 Body Response to Health Behaviors 3(3,0) Positive benefits and the negative impact of certain behaviors at cellular, organ, and body-system levels are examined. The pathways of selected injury and disease are explored. Expected physiological changes are applied in identifying strategies for promoting health in the presence (or absence) of disease. Health majors and minors will be given enrollment priority. *Coreq:* BIOSC 223 or consent of instructor.

HLTH 310 Women's Health Issues 3(3,0) Exploration of specific health needs of women, with emphasis on understanding and preventing problems of women's health. Health majors and minors will be given enrollment priority. *Preq:* Two-semester sequence in science or consent of instructor.

HLTH 315 Social Epidemiology 3(3,0) Exploration of the current problems and issues associated with the health of population groups. The interrelationships of biological, sociocultural, behavioral, environmental, political, and economic risk factors and the health and illness patterns of those in population groups are examined. *Preq:* HLTH 298, 380 or consent of instructor.

HLTH 320 Health Maintenance for Men 3(3,0) Exploration of specific health maintenance needs of men, with emphasis on understanding and preventing problems of men's health. Health majors and minors will be given enrollment priority. *Preq:* Two-semester sequence in science or consent of instructor.

HLTH 340 Health Promotion Program Planning 3(3,0) Students develop skills to conduct community health needs assessments and to plan and evaluate theoretically grounded health promotion intervention programs for diverse populations. Best practices for specific health behavior change interventions are identified. *Preq:* HLTH 240, 298.

HLTH 350 Medical Terminology and Communication 3(3,0) Skills in building, analyzing, defining, pronouncing, and spelling medical terms related to the human body are developed and applied through electronic communication. *Preq:* Junior standing or consent of instructor.

HLTH (APEC, CRD) 361 Introduction to Health Care Economics 3(3,0) See C R D 361.

HLTH 380 Epidemiology 3(3,0) Introduces epidemiological principles and methods used in the study of the origin, distribution, and control of disease. Health majors and minors will be given enrollment priority. *Coreq:* Approved statistics course.

HLTH H395 Honors Research Seminar 3(3,0) Students review basic steps in the development of an honors research proposal and develop a draft of the proposal under the supervision of a faculty mentor. Students are also required to attend research presentations of senior departmental honors students. *Preq:* HLTH 380, Junior standing, statistics course, or consent of instructor.

HLTH 398 Health Appraisal Skills 1(0,3) Utilizes laboratory experiences to measure health risk, interpret laboratory health data, and design personal health programs. Restricted to Health Science majors. *Preq:* HLTH 298.

HLTH 400, 600 Selected Topics in Health 1-6(0,3-18) Topics selected to meet special and individualized interest of students in health. May be repeated for a maximum of nine credits, but only if at least two different topics are covered. *Preq:* Junior standing, consent of instructor.

HLTH 401, 601 Health Consumerism 3(3,0) Exploration of consumer decisions regarding health products and services emphasizing strategies for decision making. Health majors and minors will be given enrollment priority. *Preq:* Two-semester sequence in science or consent of instructor.

HLTH 402 Principles of Health Fitness 4(3,1) Students apply current theories concerning physiological effects of exercise to select populations; understand the relationship between exercise and various chronic diseases; and design, execute, and evaluate exercise programs in terms of safety and effectiveness. *Preq:* HLTH 398, CPR certification. *Coreq:* BIOSC 223.

HLTH 410, 610 Maternal and Child Health 3(3,0) Focuses on key issues concerning the health status and needs of mothers and children. Topics include primary health care, measurement and indicators of health status, health of minorities, role of families, and major programmatic interventions towards the health needs of these two groups.

HLTH 411 Health Needs of High Risk Children 3(3,0) Analysis and evaluation of health needs of high-risk families and special needs children from the prenatal period to age six. Emphasizes health maintenance and early intervention strategies. *Preq:* HLTH 410.

HLTH 415, 615 Public Health Issues in Obesity and Eating Disorders 3(3,0) In-depth review of prevalence, risk factors, consequences, and treatments of obesity and other eating disorders. Focuses on the public health importance of cultural norms, prevention, and early intervention related to obesity and eating disorders. *Preq:* Junior standing in Health Science or consent of instructor.

HLTH 419 Health Science Internship Preparation Seminar 1(1,0) Preparation for internship experience. Includes topics such as résumé development, interviewing skills, internship agency selection, and responsibilities of student, department, and agency. *Preq:* Junior standing in Health Science, ENGL 304 or 314.

HLTH 420, 620 Health Science Internship 1-6(0,3-18) Under supervision in an approved agency, students have an opportunity for on-the-job experiences. Students are placed in an agency and develop personal/professional goals and objectives appropriate to the setting, population, and health issues. Students create a comprehensive exit portfolio in a digital format. May be repeated for a maximum of six credits. *Preq:* HLTH 419, minimum grade-point ratio of 2.0, Junior standing in Health Science, consent of instructor.

HLTH 430, 630 Health Promotion of the Aged 3(3,0) Focuses on analysis and evaluation of health issues and health problems of the aged. Emphasizes concepts of positive health behaviors. Health majors and minors will be given enrollment priority. *Preq:* Developmental psychology, two-semester sequence in science, or consent of instructor.

HLTH 431 Public and Environmental Health 3(3,0) Principles of environmental health emphasizing understanding various health concerns created by the interactions of people with their environment. Students evaluate the impact of environmental factors on public health policy decisions. Meets specific area of need in environmental health issues.

HLTH 440 Managing Health Service Organizations 3(3,0) Provides the conceptual and theoretical foundation of management and organizational theory of health service organizations. Focuses on the role of health services managers and how they modify and maintain organizations.

HLTH 450, 650 Applied Health Strategies 3(3,0) Students plan, implement, and evaluate strategies to promote health through individual behavior changes. Both healthful and unhealthful behaviors are included. Examples include smoking cessation, weight management, and stress management. *Preq:* HLTH 480, Health Science major.

HLTH 460 Health Information Systems 3(3,0) Focuses on the application of information systems to patient care and management support systems. Provides a general understanding of how the information needs of health professionals and health service organizations can be met through the proper acquisition, storage, analysis, retrieval, and presentation of data.

HLTH 470 International Health 3(3,0) Deepens students' knowledge of global health and how public health work is conducted internationally. Introduction to assessment of international health needs and designing, implementing, managing, and evaluating public health programs in international settings. *Preq:* HLTH 298.

HLTH 475 Principles of Health Care Operations Management and Research 3(3,0) Provides a foundation in concepts, structure, and analysis that enables an understanding of the importance of production/operations management within health care organizations and systems. Includes training in operations research methods and objectives. *Preq:* HLTH 490.

HLTH 478 Health Policy Ethics and Law 3(3,0) Critical examination of the legal and ethical dimensions of public health policy formation and change and how legal, ethical, and policy considerations influence health services administration and delivery. Health majors and minors will be given enrollment priority. *Preq:* HLTH 202, 240, 298, 380 or consent of instructor.

HLTH 479 Financial Management and Budgeting for Health Service Organizations 3(3,0) Overview of basic principles of budgeting and financial management and analysis for health services organizations. Techniques for financial management are provided with an emphasis on health services environments. *Preq:* HLTH 440.

HLTH 480 Community Health Promotion 3(3,0) Focuses on the participatory approach in the planning and implementation of community health programs. Emphasizes professional ethics, needs assessment, coalition building, proposal writing, and implementation of special events in the community. *Preq:* HLTH 303, 340, 380, Health Science major.

HLTH 490 Research and Evaluation Strategies for Public Health 3(3,0) Discussion of research in health. Focuses on analysis of reported research. Ethical, moral, and legal issues are discussed. *Preq:* EX ST 301, MTHSC 203 or 301.

HLTH H495 Honors Thesis Seminar 3(3,0) Senior honors thesis seminar in public health sciences. Independent research is conducted under the supervision and guidance of a faculty mentor for students enrolled in departmental honors program in support of an honors thesis/service learning research project. *Preq:* HLTH H395, Senior standing, or consent of instructor.

HLTH H496 Honors Research Colloquium 1(1,0) Students enrolled in departmental honors present independent research conducted under the supervision of a faculty member in a public research forum to other honors students and public health professionals and/or submit a paper or presentation based on this research for publication. *Preq:* HLTH H495, Senior standing.

HLTH 497 Creative Inquiry—Public Health 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of 12 credits.

HLTH 498, 698 Improving Population Health 3(3,0)

Critical examination of current and emerging issues in improving public health practice and population health. Covers examples in empirical and applied research, revealing future trends in population health. Health Science majors and minors will be given enrollment priority. *Preq:* HLTH 240, 298, 380, or consent of instructor.

HLTH 499 Independent Study 1-3(1-3,0)

Study of selected problems in health under the direction of faculty member chosen by the student. Student and faculty member develop a course of study designed for the individual student and approved by the department chair prior to registration. May be repeated for a maximum of six credits. *Preq:* Junior standing or consent of instructor.

HEALTH, EDUCATION AND HUMAN DEVELOPMENT

HEHD 199 Creative Inquiry I 1-3(1-3,0)

In consultation with and under the direction of a faculty member, students pursue a first phase of scholarly activities in teams. These creative inquiry projects may be discipline-specific or interdisciplinary in nature. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

HEHD 299 Creative Inquiry II 1-3(1-3,0)

In consultation with and under the direction of a faculty member, students pursue a second phase of scholarly activities in teams. These creative inquiry projects may be discipline-specific or interdisciplinary in nature. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits. *Preq:* Sophomore standing, consent of instructor.

HEHD 399 Creative Inquiry III 1-3(1-3,0)

In consultation with and under the direction of a faculty member, students pursue a third phase of scholarly activities in teams. These creative inquiry projects may be discipline-specific or interdisciplinary in nature. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits. *Preq:* Junior standing, consent of instructor.

HEHD 400 Introduction to Leadership Theories and Concepts 3(2,1)

Interdisciplinary course introduces students to the nature of leadership. Students gain a broad understanding of the history and origins of leadership, theoretical approaches to leadership, and the essence of contemporary leadership. Students are encouraged to test their ability to apply these concepts to life experiences. *Preq:* Junior standing or consent of instructor.

HEHD 410 Leadership Behavior and Civic Engagement 3(2,1)

Students couple concepts of social justice and civic engagement with theoretical foundations from HEHD 400 to complete a comprehensive theory to practice project. Students are introduced to a comprehensive leadership skill set to become active change agents for the common good. *Preq:* HEHD 400.

HEHD 420 Leadership Application and Experience 3(2,3)

Students are immersed in a practical leadership experience utilizing knowledge and skills gained in HEHD 400 and 410. Students identify an issue or problem and practice leadership by developing and implementing a community project. Students are challenged to commit themselves to long-term engagement as agents of change. *Preq:* HEHD 410.

HEHD 499 Creative Inquiry IV 1-3(1-3,0)

In consultation with and under the direction of a faculty member, students pursue a fourth phase of scholarly activities in teams. These creative inquiry projects may be discipline-specific or interdisciplinary in nature. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits. *Preq:* Senior standing, consent of instructor.

HISTORIC PRESERVATION

Professor: J. Burden

H P 410, 610 History and Theory of Historic Preservation 3(3,0)

Survey history of preservation that explores a variety of theoretical issues that impact the discipline. Provides a basis for critical evaluation of historic preservation. *Preq:* Three semesters of Art and Architectural History or equivalent or consent of instructor.

H P 411, 611 Archival Research and Oral History in Historic Preservation 3(3,0)

Introduction to historic buildings and landscapes research. Emphasizes researching the physical and social history of buildings and places. Charleston and its environs provide case study projects for archival research.

H P 412, 612 Materials and Methods of Historic Construction 3(3,0)

Survey of traditional materials and methods of construction in America from the 18th through the early 20th century. Scientific examination of historic construction provides case studies. *Preq:* Three semesters of Art and Architectural History or equivalent or consent of instructor.

HISTORY

Professors: S. L. Barczewski, E. D. Carney, H. R. Grant, T. J. Kuehn, Chair; S. G. Marks, D. M. McKale, E. E. Moise, R. L. Saunders, Jr; *Associate Professors:* A. A. Bartley, P. C. Anderson, J. R. Andrew Jr., J. M. Burns, C. A. Grubb, P. E. Mack, M. N. Taylor-Shockley; *Assistant Professors:* A. Bein, R. A. Chico, C. S. Dunn, J. L. Grisinger, J. D. Hamblin, M. S. Silvestri; *Visiting Assistant Professor:* J. B. Jeffries

HIST 100 Higher Education and Clemson 1(1,0)

Introduction to higher education, its background and development in the western world, emphasizing land-grant institutions and Clemson University in particular.

HIST 101, H101 History of the United States 3(3,0)

Political, economic, and social development of the American people from the period of discovery to the end of Reconstruction.

HIST 102, H102 History of the United States 3(3,0)

Political, economic, and social development of the American people from the end of Reconstruction to the present.

HIST 122, H122 History, Technology, and Society 3(3,0)

Topics in the history of technology with emphasis on how technology affects society and how society shapes technology. Emphasis is on 19th and 20th century America, but some material from other periods of Western Civilization and other world regions may be discussed.

HIST 124, H124 Environmental History Survey 3(3,0)

Introduction to environmental history, in the United States and globally, with emphasis on changing attitudes toward the environment and the interaction between science and public policy.

HIST 172, H172 The West and the World I 3(3,0)

Examines the history of the West from early times until the 16th century. After a comparative evaluation of the emergence of civilization around the globe, course concentrates on the history of the peoples of Europe up to the age of European exploration and overseas expansion.

HIST 173, H173 The West and the World II 3(3,0)

Surveys the history of the West in modern times, from the late 15th century to the present. Particular emphasis is placed on Europe's interaction with non-western societies. Through cross-cultural comparisons, European history is placed in global context.

HIST 193 Modern World History 3(3,0)

Political, economic, social, and cultural history of the modern world from the 19th century to the present.

HIST 198 Current History 1(1,0)

Examination of major events and problem areas in the news emphasizing their historical context and possible long-range significance. May be repeated for a maximum of three credits. Does not count toward the requirements of the major or minor in History.

HIST 200 Fort Hill Internship 1-3

Provides practical experience in public history museum work and/or historical preservation in the setting of Fort Hill. May be repeated for a maximum of three credits. To be taken Pass/Fail only. *Preq:* Consent of internship committee.

HIST 201 Prelaw Internship 1-3

Faculty-supervised internship in a law firm or other legal setting. Introduces students to the workings of the legal system. To be taken Pass/Fail only. *Preq:* History major and sophomore standing.

HIST 202 Internship 1-3(0,3-9)

Exposes History majors to hands-on experience in research, analysis, and public presentation of historical scholarship. May include working with faculty on research projects, in museums or historical organizations, or at sites. May be repeated for a maximum of three credits. To be taken Pass/Fail only. *Preq:* Sophomore standing.

HIST 289 Creative Inquiry—History 1-4(1-4,0)

In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of nine credits.

HIST 299 Seminar: The Historian's Craft 4(3,2)

Writing and speaking intensive course to introduce History majors to study of what history is and what a historian does, including historiography, research techniques, ethics of the historical profession, and forms of presentation. *Preq:* History major.

- HIST 300 History of Colonial America 3(3,0)** Development of American institutions and customs in the period before 1776. Considerable emphasis is placed on the imperial relations between Great Britain and her colonies and upon the movement towards and the philosophy of the American Revolution.
- HIST 301 American Revolution and the New Nation 3(3,0)** Study of the various historical explanations leading to an understanding of the American Revolution, the establishment of the nation under the Constitution, and the first decade of the new nation. Special emphasis is on developing an understanding of individual motivation and ideological development present during the last four decades of the 18th century.
- HIST 302 Age of Jefferson, Jackson, and Calhoun 3(3,0)** Formation and growing pains of the new nation through the Federal and Middle periods of its history emphasizing economic and political development, the westward movement, and the conflicting forces of nationalism and sectionalism.
- HIST 303 Civil War and Reconstruction 3(3,0)** Study of the political, military, and social aspects of the sectional conflict and of the era of Reconstruction. Some emphasis is placed on the historical controversies inspired by the period.
- HIST 304 Industrialism and the Progressive Era 3(3,0)** Study of American society in the period between the 1880s and 1930s. Emphasizes the effects of industrialization and urbanization on the American people.
- HIST 305 The United States in the Jazz Age, Depression, and War: 1918–1945 3(3,0)** Starting at Armistice Day, 1918, course analyzes the dawn of the ages of mass consumption and mass communication, the Crash of 1929, Franklin Roosevelt and the New Deal, the gathering war clouds in Europe and Asia, and the Great Crusade of World War II. *Prq:* Sophomore standing.
- HIST 306 The United States in the Postwar World: 1945–1975 3(3,0)** Examination of the American experience from the end of World War II through the period of the Korean and Vietnam wars, the Cold War, the Civil Rights movement, the counter-culture of the 1960s, assassinations, and Watergate.
- HIST 308 The United States in the Age of Reagan and Clinton: 1975–Present 3(3,0)** The United States and the world in the recent era of economic and political upheaval, the end of the Cold War, the rise of the global economy and terrorism, social and cultural change, and deepening political and social divisions. *Prq:* Sophomore standing.
- HIST 311 African Americans to 1877 3(3,0)** Study of the African-American experience in the United States from the African past through slavery to 1877.
- HIST 312 African American History from 1877 to the Present 3(3,0)** Study of African American experience in the United States from 1877 to the present.
- HIST 313, H313 History of South Carolina 3(3,0)** Political, economic, and social development of South Carolina from 1670 to the present.
- HIST 314 History of the South to 1865 3(3,0)** Origins and development of political, social, economic, and cultural institutions of the South from the Colonial period to the end of the Civil War and the role of the South in the nation's development.
- HIST 316 American Social History 3(3,0)** Study of American society, including the relationship among classes, ethnic groups, regions, and sexes, from the Colonial period to the present.
- HIST 318 History of American Women 3(3,0)** Survey course of the history of American women emphasizing the changing role of women in American culture and society.
- HIST 319 Gender and Law in United States History 3(3,0)** Survey of how law has reflected and created distinctions on the basis of gender and sexuality throughout United States history. Emphasizes the relationship between legal rules and social conditions and the way in which groups have challenged these legal categories over time.
- HIST 321 History of Science 3(3,0)** Survey of the development of science in the Western world, emphasizing the period from the Renaissance to the present.
- HIST 322 History of Technology 3(3,0)** History of the major developments in Western technology and their relationships to the societies and cultures in which they flourished.
- HIST 323 History of American Technology 3(3,0)** History of developments in technology and their role in American life with particular emphasis on the American Industrial Revolution and the 20th century.
- HIST 324 History of the South, 1865 to the Present 3(3,0)** Development of political, social, and cultural institutions of the South from the end of the Civil War to the present and the South's relationship to the rest of the nation.
- HIST 325 American Economic Development 3(3,0)** Economic development of the United States from Colonial to recent times, emphasizing the institutional development of agriculture, banking, business and labor, and government regulations and policy.
- HIST 326 History of American Transportation 3(3,0)** Examines the principal forms of transportation in the United States from colonial times to the present, including water, road, canal, railroad, internal combustion, and air. Emphasizes technological developments and economic, geographic, and social impact of specific transport forms.
- HIST 327 American Business History 3(3,0)** Survey of the history of American business using a case-study approach. Focuses on the effects that policies and institutions have on individual businesses.
- HIST 328 United States Legal History to 1890 3(3,0)** Survey of the American legal system in its historical perspective from Colonial times to 1890. Emphasizes the relationship between law and society, the way in which the practice of law changed American society, and the way in which social development affected both the theory and practice of the law.
- HIST 329 United States Legal History Since 1890 3(3,0)** Examination of the social, cultural, intellectual, economic, and political forces that have helped shape the law in the U.S. since 1890.
- HIST 330 History of Modern China 3(3,0)** Growth and development of Chinese civilization from ancient times to the present. Emphasis is on 20th century China, particularly since the rise to power of the Communist regime.
- HIST 333 History of Modern Japan 3(3,0)** Origin and development of Japanese civilization with particular emphasis on modern Japan from mid-19th century to the present.
- HIST 334 Premodern East Asia 3(3,0)** Introduction to histories of China and Japan, from antiquity to approximately 1850. Political, religious, artistic, and other aspects of premodern society are examined and compared in order to gain significant insights regarding the premodern antecedents of these two dynamic and important nations.
- HIST 337 History of South Africa 3(3,0)** Examines the important trends in the history of South Africa from earliest times to the present. Topics include nature of precolonial society, European immigration, rise of industrial capitalism, advent of Apartheid, and the liberation struggle.
- HIST 338 African History to 1875 3(3,0)** Study of sub-Saharan Africa from antiquity to European colonial rule, exploring the development of Stone Age cultures; agricultural and pastoral societies; ancient civilizations; political, economic, and social systems; gradual shift of initiative from the interior to the coast; and various slave trades.
- HIST 339 Modern Africa, 1875 to the Present 3(3,0)** Study of sub-Saharan Africa from 1875 to the present, with focus on the development and decline of European imperialism, dilemmas of African independence, and ethnic struggles in Southern Africa.
- HIST 340 Latin America: From Conquest to Independence 3(3,0)** Examination of the encounters, collaborations, and clashes that characterized the conquest period and beyond in Latin America. Readings are assigned regarding the spiritual, biological, social, and political consequences of the meeting of Indians, Africans, and Europeans. Historical sources include images, artwork, letters, and memoirs.
- HIST 341 Modern Mexico 3(3,0)** Introduction to the geography of the region; origins and progress of the Independence movements; political, economic, and social developments after 1825; and current domestic and international problems.
- HIST 342 South America Since 1800 3(3,0)** Introduction to the geography of the region; origins and progress of the Independence movements; political, economic, and social developments after 1825; and current domestic and international problems.
- HIST 351 Ancient Near East 3(3,0)** History of the peoples and civilizations of the Near East from the Sumerians to the establishment of Roman power in this region. Includes geography, mythology, religious, and economic currents as well as the methods and discoveries of archaeology.
- HIST 352 Egypt in the Days of the Pharaohs 3(3,0)** Egyptian civilization from its beginning until the period of Roman conquest. Includes a survey of political history but also deals with daily life, making much use of archaeological evidence.

HIST 353 Women in Antiquity 3(3,0) Focuses on women in the ancient period in Mesopotamia, Israel, Egypt, Greece, Rome, and in the early Christian Church. Formation of gender roles and issues related to ancient sexuality also receive attention.

HIST 354 The Greek World 3(3,0) Study of Greek civilization from its beginning until the time of the Roman conquest, concentrating on the social institutions of the Greek city-states.

HIST 355 The Roman World 3(3,0) Considers the rise of Rome to world empire and the international civilization it dominated. Concentrates on the nature of the political change from Republic to monarchy with particular emphasis on city life and the causes of its decline.

HIST 361 History of England to 1688 3(3,0) Evolution of English political, social, economic, and cultural institutions to the 17th century. (Study Abroad)

HIST 363 Britain Since 1688 3(3,0) Study of political, cultural, social, economic, and imperial issues in the history of the British Isles from the late 17th century to the present.

HIST 365 British Cultural History 3(3,0) Examination of topics in British cultural history from the 17th century to the present. Emphasizes the 19th and 20th centuries.

HIST 367 Modern Irish History 3(3,0) Examines Irish history over the past four centuries, with particular attention to the 19th and 20th centuries. Irish political, social, economic, and cultural history, Anglo-Irish relations, and the Irish diaspora are considered.

HIST 370 Medieval History 3(3,0) Survey of the period from the eclipse of Rome to the advent of the Renaissance, emphasizing human migrations, feudalism, rise of towns, and cultural life.

HIST 372 The Renaissance 3(3,0) Examination of the transitional period of European civilization (ca. 1300–1500) emphasizing institutional, cultural, and intellectual developments.

HIST 373 Age of the Protestant Reformation 3(3,0) Evolution of Modern Europe (ca. 1500–1660), as affected by the Reformation, wars of religion, and growth of nation-states. Study includes intellectual advances and the beginnings of European expansion overseas.

HIST 374 Europe in the Age of Reason 3(3,0) Study of the quest for order and the consolidation of the European state system between 1660 and 1789 with emphasis on the idea of absolutism, the question of French hegemony, and the synthesis of the 18th-century Enlightenment.

HIST 375 Revolutionary Europe 3(3,0) History of Europe from the outbreak of the French Revolution through the Revolutions of 1848 emphasizing the conflict between the forces of change and those of conservatism, within the states and in Europe in general.

HIST 377 Europe, 1914–1945 3(3,0) Focuses on Europe during two major wars and the peacetime adjustments Europeans made, or failed to make, during the twenty-year interim between those wars.

HIST 378 Europe Since 1945 3(3,0) Focuses on how World War II completed the destruction of European global hegemony, creating a bipolar continent with the west dominated by the United States and the east by Soviet Russia, and how Europe adjusted to this situation.

HIST 380 Imperial Germany 3(3,0) German history from the beginning of the German Empire, 1870–71, through World War I. Emphasizes the influence of militarism, nationalism, anti-Semitism, and xenophobia on the German culture and political process.

HIST 381 Germany Since 1918 3(3,0) German history from the time of Germany's defeat in World War I, through the Nazi period and World War II. Culminates with the study of a divided Germany.

HIST 384 History of Modern France 3(3,0) French history from mid-19th century to the present with particular emphasis on France since 1900.

HIST 385 History of Imperial Russia 3(3,0) Survey of the formative years of the Russian Empire from the time of accession of Peter the Great to the time of the Russian Revolution. Social, political, diplomatic, and intellectual developments are given equal treatment.

HIST 386 History of the Soviet Union 3(3,0) Soviet history from the revolution to the present. Surveys the creation and subsequent development of the communist political and social system, with attention given to culture and diplomacy.

HIST 387 The Russian Revolution 3(3,0) History of one of the most formative series of events of the 20th century. Follows the crisis of Imperial Russia, its downfall during World War I, and subsequent revolutionary upheaval leading to the formation of the USSR.

HIST 389 Creative Inquiry—History 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of nine credits.

HIST 390 Modern Military History 3(3,0) Survey of the development of modern warfare and the influence of technological change on warfare. Particular attention is given to the major conflicts of the 20th century.

HIST 391 Post World War II World 3(3,0) Examines the world in the age of the Cold War; the breakdown of the colonial empires; and racial, religious, ethnic, national, and social tensions. The United States provides the central core to the class.

HIST 392 History of the Environment of the United States 3(3,0) Examination of the historical development of the attitudes, institutions, laws, people, and consequences that have affected the environment of the United States from pre-Columbian days until the present. Emphasizes the interaction of human beings within and with the environment.

HIST 393 Sports in the Modern World 3(3,0) Analysis of the global evolution and diffusion of sports in the industrial age emphasizing the linkage of sports structure and performance to the larger social context.

HIST 394 Non-Western History 3(3,0) Examines the important trends in world history since 1500—including capitalism, industrialization, nationalism, migration, and imperialism—with a focus on non-Western regions. *Prq:* HIST 173.

HIST 395 Civil Rights History 3(3,0) Examines the development of American civil rights from the creation of the Constitution through the present. Emphasis is on the legal struggle of African Americans for civil rights, but how other groups fought for rights in the courts is also considered.

HIST 396 The Middle East to 1800 3(3,0) Examines the histories, cultures, and societies of the Middle East from the rise of Islam in the seventh century to the eve of European colonial penetration.

HIST 397 Modern Middle East 3(3,0) Examines the histories, cultures, and societies of the Middle East from the 18th century to the present day with particular emphasis on contemporary issues.

HIST 400, 600 Studies in United States History 3(3,0) Topics and problems in the history of the United States from the Colonial era to the present. May be repeated once for credit with departmental consent.

HIST 409 Kennedy Assassination and Watergate 3(3,0) Journey into the underbelly that examines the diverse elements of national security, divisive politics, the Cold War and Cuba, FBI, CIA, the mob, fanaticism, anomie, and threats to the stability of the republic that seem to have come together in Dallas in 1963 and in Watergate. *Prq:* Junior standing.

HIST 420, 620 History and Film 3(2,3) Analyzes the role of the cinema in the construction and dissemination of history. May be repeated once for credit with departmental consent.

HIST 424, 624 Topics in History of Medicine and Health 3(3,0) Selected topics in the development of medicine and health care including public attitudes towards health and medicine.

HIST 436, 636 The Vietnam Wars 3(3,0) Wars in Vietnam are seen in two phases. The First Indochina War, 1946–54, is covered briefly. Main body of the course covers the Second Indochina War, which began as a guerrilla conflict in 1959–60 and ended as a mostly conventional war in the Communist victory of 1975.

HIST 438, 638 Problems in African Historiography and Methodology 3(3,0) Concentrates on major issues in the field of African history with an additional focus on methodological concerns. May be repeated once for credit with departmental consent.

HIST 440, 640 Studies in Latin American History 3(3,0) Consideration of selected and varied topics in Latin American history through readings, discussions, and individual or group projects. Special attention is given to the use of an inquiry or problem-solving method of historical analysis and to the cultivation of a comparative perspective. May be repeated once for credit with departmental consent.

HIST 450, 650 Studies in Ancient History 3(3,0) Selected topics in ancient history ranging from pre-Biblical times to the fall of the Roman Empire. May be repeated once for credit with departmental consent.

HIST 451, 651 Alexander the Great 3(3,0) Focuses on the career of Alexander the Great and deals with the history and archaeology of ancient Macedonia.

HIST 460, H460, 660 Studies in British History 3(3,0) Examination of selected themes, topics, or periods in British history from Anglo-Saxon times to the present. May be repeated once for credit with departmental consent.

HIST 470, 670 Studies in Early European History 3(3,0) Study of selected topics or themes in European history from the fall of the Roman Empire to the age of industrialization. May be repeated once for credit with departmental consent.

HIST 471, H471, 671 Studies in Modern European History 3(3,0) Study of selected topics or problems in European history from the end of the Old Regime to the present. May be repeated once for credit with departmental consent.

HIST 490 Senior Seminar 3(3,0) Seminar in current research themes in history. Students conduct directed research on a particular topic and learn research, writing, and oral presentation techniques. Seminar topics vary from section to section and from semester to semester. *Preq:* History major, Senior standing, and HIST 299 with a C or better.

HIST 491, H491, 691 Studies in the History of Science and Technology 3(3,0) Selected topics in the development of science and technology emphasizing their social, political, and economic effects. May be repeated once for credit with departmental consent.

HIST 492, 692 Studies in Diplomatic History 3(3,0) Selected topics and problems in international conflict and conflict resolution among nations. Concentration is usually in 20th century history. May be repeated once for credit with departmental consent.

HIST 493, 693 Studies in Social History 3(3,0) Studies in the ways people have earned their livings and lived their lives, individually and as communities, in the confines of different societies. May be repeated once for credit with departmental consent.

HIST 494, 694 Studies in Comparative History 3(3,0) Selected topics in comparative history, contrasting and comparing similar historic developments in different nations, geographic areas, or civilizations. May be repeated once for credit with departmental consent.

HIST 495, 695 Studies in the History of Ideas 3(3,0) Selected topics and themes in the development of ideas that have had an impact on the behavior of individuals and civilizations. May be repeated once for credit with departmental consent.

HIST 496, 696 Studies in Legal History 3(3,0) Study of selected problems in the development of law and the system of criminal and civil justice. May be repeated once for credit with departmental consent.

HIST H497 Senior Honors Research 3(3,0) Research for the preparation of senior honors thesis. *Preq:* Senior standing, completion of a 400-level history course, approval of the History Department. May be repeated once for credit with departmental consent.

HIST H498 Senior Honors Thesis 3(3,0) Writing of the senior honors thesis. May be repeated once for credit with departmental consent. *Preq:* HIST H497.

HIST 499 Independent Study 1-3(1-3,0) Study of selected problems in history under the direction of a faculty member chosen by the student. Student and faculty member develop a course of study designed for the individual student and approved by the department chair prior to registration. May be repeated once for credit with departmental consent.

HONORS

HON H190 Freshman Colloquium: Arts and Humanities (Literature) 3(3,0) Intellectually intensive seminar that engages freshman honors students in dialogue about the "idea of the University." Explores key literary works that enhance understanding of historical eras, intellectual and artistic movements, or cultures. Topics vary. *Preq:* Membership in Calhoun Honors College.

HON H191 Freshman Colloquium: Arts and Humanities (Non-Literature) 3(3,0) Intellectually intensive seminar that engages freshman honors students in dialogue about the "idea of the University." Explores historical eras, intellectual and artistic movements, or cultures emphasizing multiple tools of analysis, including literature, art, music, and film. Topics vary. *Preq:* Membership in Calhoun Honors College.

HON H192 Freshman Colloquium: Social Science 3(3,0) Intellectually intensive seminar that engages freshman honors students in dialogue about the "idea of the University." Explores foundations and consequences of human thought and behavior at the individual and societal levels, with emphasis on concepts and tools that organize scholarly inquiry across the social and behavioral sciences. Topics vary. *Preq:* Membership in Calhoun Honors College.

HON H193 Freshman Colloquium: Cross-Cultural Awareness 3(3,0) Intellectually intensive seminar that engages freshman honors students in dialogue about the "idea of the University." Explores traditions, customs, and value systems of peoples and cultures. Examines concepts and tools that organize scholarly inquiry into world cultures emphasizing non-Western societies. Topics vary. *Preq:* Membership in Calhoun Honors College.

HON H194 Freshman Colloquium: Science and Technology in Society 3(3,0) Intellectually intensive seminar that engages honors students in dialogue about the "idea of the University." Explores interactions of the sciences and technology with society. Examines how science and technology are social enterprises and the impact of science and technology on attitudes, behaviors, and choices. Topics vary. *Preq:* Membership in Calhoun Honors College.

HON H201 Structures and Society 3(3,0) Interdisciplinary honors seminar that examines selected structures regarded as monuments to artistic creativity and technological genius and the ways that structures affect and are affected by the societies that produce them. *Preq:* Membership in Calhoun Honors College.

HON H202 Science, Culture, and Human Values 3(3,0) Interdisciplinary honors seminar that unifies natural scientific, social scientific, and humanistic disciplines into a holistic view of the modern world and its future. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Membership in Calhoun Honors College.

HON H203 Society, Art, and Humanities 3(3,0) Combines readings and methodologies from the social sciences, arts, and humanities to study the interrelationships among the disciplines and their societal effects. Subjects vary. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Membership in Calhoun Honors College.

HON H204 Honors Study/Travel 1(0,3) Study/travel experience related to a three-credit Calhoun Honors Seminar. May be repeated for a maximum of three credits, but only if different topics are covered. *Preq:* Membership in Calhoun Honors College.

HON H205 Methods of Interpretation 1(1,0) Seminar to teach students how to interpret documents, works of art, structures, and scholarly materials related to a three-credit Calhoun Honors Seminar. May be repeated for a maximum of three credits, but only if different topics are covered. *Preq:* Membership in Calhoun Honors College.

HON H206 Controversies in Science and Technology 3(3,0) Interdisciplinary honors seminar that examines social issues related to science and technology, using perspectives from science, the social sciences, and humanities. May be repeated for a maximum six credits, but only if different topics are covered. *Preq:* Membership in Calhoun Honors College.

HON H207 Reasoning, Critical Thinking, and Problem Solving 3(3,0) Interdisciplinary honors seminar that teaches a particular set of tools for thinking and analysis, showing how these tools can be applied to different kinds of problems in different disciplines. May be repeated for a maximum six credits, but only if different topics are covered. *Preq:* Membership in Calhoun Honors College.

HON H209 Border Crossings: Experiences in World Cultures 1-3(1-3,0) Readings and studies that heighten understanding of world cultures and societies. Taken in conjunction with international educational experiences approved by Calhoun Honors College. May be repeated for a maximum of six credits, with a maximum of three credit hours per study abroad experience. *Preq:* Membership in Calhoun Honors College.

HON H210 Experiencing the Arts 3(2,3) Interdisciplinary exploration of the arts through seminar discussions and attendance at performing and visual arts events on campus. Exploration of arts and aesthetics leading to performance previews, reviews, and experiences of Brooks Center and Lee Gallery events. May be repeated for a maximum of nine credits. *Preq:* Membership in Calhoun Honors College.

HON H220 Studies in Social Science 3(3,0) Discipline specific social science seminar including a disciplinary introduction (anthropology, economics, history, political science, psychology or sociology) and a detailed examination of specific theories and methods within that discipline. May be repeated for a maximum of six credits, but only if different disciplines are covered. *Preq:* Membership in Calhoun Honors College.

HON H221 Studies in Literature 3(3,0) Introduction to selected authors and literary works focused around a specific topic. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Membership in Calhoun Honors College.

HON H222 Studies in Arts and Humanities 3(3,0) Exploration of music, literature, film, philosophy or another area in humanities by examining a discipline specific topic. Focus may be on a particular scholar, era or culture idea or concept specific to a particular arts/humanities discipline. May be repeated for a maximum of six credits, but only if different disciplines are covered. *Preq:* Membership in Calhoun Honors College.

HON H400 Honors Contract 0 Advanced study and research taken in conjunction with any 300–400-level course. Contract requires prior approval by instructor and Honors Director. To be taken Pass/Fail only. May be repeated once, but only if in conjunction with a different course. *Preq:* Membership in Calhoun Honors College.

HON H499 Honors Research 12(0-3,3-36) Honors directed research in an academic discipline. Topics include, but are not limited to, literature review, research design and execution, and reporting of results. May be repeated for a maximum of 12 credits. *Preq:* Membership in Calhoun Honors College.

HORTICULTURE

Professors: H. Liu, L. B. McCarty, T. Whitwell; *Associate Professors:* J. W. Adelberg, J. E. Faust, *Chair:* D. R. Layne, C. E. Wells; *Assistant Professor:* D. G. Bielenberg

HORT 101 Horticulture 3(3,0) Environmental factors and horticultural practices affecting optimum production of floral, fruit, ornamental, and vegetable crops. Includes a survey of the various areas of horticulture and their importance to society.

HORT 102 Experience Horticulture 1(0,2) Students experience the art, science, business, and diversity of horticulture through visits to greenhouses, nurseries, botanical gardens, athletic fields, golf courses, orchards, farms, and research fields and laboratories. Students learn about horticulture from a cross section of professionals sharing their work experiences. *Preq:* Freshman or sophomore standing in Horticulture or Turfgrass.

HORT 202 Selected Topics 1-3(1-3,0) Introduction to developing trends, concepts or technologies in horticulture and/or turfgrass. May be repeated for a maximum of three credits, but only if different topics are covered. *Preq:* Consent of instructor.

HORT 208 Landscape Appreciation 3(3,0) Deepens students' appreciation of natural and built environments through a study of landscape elements, styles, and professions. Landscapes ranging in scale from residential to regional are critiqued, and design principles and landscape ethics are discussed.

HORT 212 Introduction to Turfgrass Culture 3(3,0) Studies of the introductory principles associated with the art and science of turfgrass culture. Develops an understanding of the history and evolution of turfgrasses and turfgrass culture. Explores career potentials in turfgrass management. Explains the basic scientific principles and techniques associated with the propagation and establishment of fine turfgrasses. *Preq:* BIOSC 205, 206.

HORT 213 Turfgrass Culture Laboratory 1(0,2) Provides hands-on activities and understanding of basic principles and techniques in turfgrass culture. Students learn all phases of turfgrass management including identification, turfgrass culture, common turfgrass pest identification and control. *Coreq:* HORT 212.

HORT 271 Internship 1-6(0,2-12) Preplanned, practical, supervised work experience to give beginning students on-the-job learning opportunities that support classroom experience. Students submit monthly reports and present a departmental internship seminar. Undergraduates may accumulate a maximum of six credits for participation in HORT 271 and/or 471. *Preq:* Consent of instructor.

HORT 303 Landscape Plants 3(2,3) Woody, ornamental plants and their aesthetic and functional uses in landscape developments. Study covers habit of growth, ultimate size, texture effect, period of bloom, color, and cultural requirements.

HORT 304 Annuals and Perennials 3(2,3) Annual and perennial flowers' aesthetic appeal and functional uses and needs. Color, texture, bloom time, form, size, and growth requirements as they relate to designing, planting, and maintaining colorful landscapes. *Preq:* HORT 208, 303, or consent of instructor.

HORT 305 Plant Propagation 3(2,3) All phases of plant propagation from seeds, bulbs, divisions, layers, cuttings, budding, and other types of grafting are comprehensively treated. Timing, manner, and material for making cuttings; temperature and media requirements and propagation structures for rooting cuttings of ornamental and fruit trees, shrubs, and indoor plants are studied.

HORT 306 Plant Propagation Techniques Laboratory 1(0,3) Techniques of plant propagation including sexual methods: germination, scarification, and stratification. Asexual methods including grafting, budding, cuttings, layering, tissue culture divisions, and separations. Local nurseries are visited. *Coreq:* HORT 305.

HORT 308 Landscape Design 4(3,3) Landscape planning of residential and public properties in order to achieve best use and most enjoyment from a given piece of ground. Offered fall semester only. *Preq:* HORT 208, 303, or consent of instructor.

HORT 310 Growing Landscape Plants 3(2,3) Principles, technologies, and techniques of landscape plant production and growth including environmental control and manipulation, water, nutrient and pest management, scheduling, propagation, and plant problem diagnostics. Emphasizes herbaceous ornamentals along with significant woody landscape plants. *Preq:* HORT 101 or equivalent.

HORT 400 Selected Topics 1-6(1-6,0) Advanced study of any aspect of horticulture and/or turfgrass not addressed in other courses. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Junior standing or consent of instructor.

HORT 406, 606 Nursery Technology 3(2,3) Principles and techniques in handling nursery crops. *Preq:* HORT 303, 305.

HORT 408 Horticulture Discovery and Inquiry 1-3(1-3,0) Students learn about horticulture through research, service learning, and/or creative inquiry projects. They explore a topic of interest with faculty, organize a quality proposal, complete the project, and report results to appropriate professional audiences. May be repeated for a maximum of nine credits. *Preq:* Junior standing or consent of instructor.

HORT 409 Seminar 1(1,0) Recent research work on various phases of horticulture, methods of conducting investigations, and preparation of report of investigations.

HORT 412, 612 Advanced Turfgrass Management 3(2,3) Advanced principles and practices associated with turfgrass management for golf courses, sports fields, sod production, and commercial lawn care. Topics include turfgrass physiology, plant growth and development, construction, turfgrass nutrition, irrigation, drainage, pesticide use and fate, and development of effective management systems. *Preq:* CSENV 202, HORT 212, or consent of instructor.

HORT 420, 620 Applied Turfgrass Physiology 3(3,0) Advanced course in turfgrass science and management. Provides the current status and development of turfgrass stress physiology and research. Main topics include temperature, drought, traffic, edaphic stresses, new developments in the turf industry and environmental stewardship. *Preq:* HORT 212, 213.

HORT (FOR) 427, 627 Urban Tree Care 3(3,0) See FOR 427.

HORT (CSENV) 433, 633 Landscape and Turf Weed Management 3(2,2) Weed management strategies that include cultural, biological, and chemical methods are studied for landscape and turfgrass areas. Problem-solving skills and herbicide characteristics are emphasized. *Preq:* HORT 212 or consent of instructor.

HORT 455, 655 Just Fruits 3(3,0) Students explore the origins, biology, culture, and production of major temperate zone fruits—apples, berries, and cherries to pawpaws, peaches, and pomegranates, the familiar to the forbidden. They discover principles, practices, and technologies employed to grow, protect, and harvest the fruits that feed us from commercial orchards, organic farms, and backyards. *Preq:* HORT 101 or consent of instructor.

HORT 456, 656 Vegetable Crops 3(3,0) Principles and practices employed in commercial growing and marketing of vegetable crops with emphasis on plant characteristics, cultivars, management practices, harvest, quality factors and grading, storage, economic importance, and areas of production.

HORT 461, H461, 661 Problems in Landscape Design 4(3,3) Landscape planning for larger residential properties, schools, industrial plants, real estate developments; detailed finished plans; further study of materials used; original problems; field study. *Preq:* HORT 308 or consent of instructor.

HORT (BIOSC, GEN) 465, 665 Plant Molecular Biology 3(3,0) Study of fundamental plant processes at both the cellular and molecular levels. Topics include genome structure and organization (both nuclear and organellar); regulation of gene expression and its role in cellular and whole-plant processes; transposable genetic elements; applications for biotechnology. *Preq:* Junior standing or consent of instructor; BIOSC 304 or 305; GEN 302.

HORT 471, 671 Advanced Internship 1-6(0,2-12)
Preplanned work experience under competent supervision in approved agency dealing with horticultural endeavors. Gives advanced students on-the-job learning opportunities to apply acquired knowledge and skills. Monthly reports and final departmental seminar required. Undergraduates may accumulate a maximum of six credits for participation in HORT 271 and/or 471. *Preq:* Junior standing and consent of instructor.

HORT 472, 672 Garden Experiences in Youth Development 2(1,3) Exploration of the role of gardening and related outdoor experiences in enhancement of educational development, self-esteem and pro-social behavior in elementary school children. *Preq:* Senior standing and consent of instructor.

HUMANITIES

Professor: S. K. Eisiminger; *Associate Professor:* A. Bennett

HUM 301 Humanities 3(3,0) Introduction to humanistic studies focusing on relationships among disciplines—painting, sculpture, architecture, music, literature, philosophy, and drama—beginning with prehistory and continuing to the Renaissance.

HUM 302 Humanities 3(3,0) Introduction to humanistic studies focusing on relationships among disciplines—painting, sculpture, architecture, music, literature, philosophy, and drama—beginning with the 17th century and continuing to the present.

HUM 306 Creative Genius in Western Culture 3(3,0) Investigation of creativity through study of great innovators in art, literature, music, and ideas. May be repeated once for credit.

HUM 309 Studies in Humanities 3(3,0) Interdisciplinary approach to the humanities. Special subject matter varies according to the instructor and as approved by the chair of the English Department. May be repeated once for credit.

HUM (ENGL) 456, 656 Literature and Arts of the Holocaust 3(3,0) See ENGL 456.

INDUSTRIAL ENGINEERING

Professors: A. K. Gramopadhye, *Chair*; W. G. Ferrell Jr., S. A. Shappell; *Associate Professors:* B. R. Cho, J. S. Greenstein, M. E. Kurz, B. J. Melloy; *Assistant Professors:* S. K. Garrett, M. E. Mayorga, K. M. Taaffe; *Research Assistant Professor:* P. F. Stringfellow

I E 200 Sophomore Seminar in Industrial Engineering 1(1,0) Addresses the industrial engineering program, best student practices, and career paths. Invited lecturers, as needed, and faculty provide lectures and demonstrations. *Preq:* CES 101 or 102.

I E 201 System Design I 4(3,3) Introduction to the design of industrial engineering systems. Design methodologies are introduced in the context of a design process that includes identifying user needs; developing a design specification; generating, evaluating, refining, and selecting design concepts; detail design; constructing, testing, and refining prototypes; and delivering the product to the customer. *Preq:* CES 102, ENGL 103.

I E 210 Design and Analysis of Work Systems 3(2,3) Work methods engineering, human factors and ergonomics, and workplace design are discussed.

I E 220 Design of Information Systems in Industrial Engineering 3(3,0) Introduction to Visual Basic and object-oriented programming principles, databases, and software applications of human-centered system design.

I E 268, H268 Creative Inquiry Seminar in Industrial Engineering 1(1,0) Students are introduced to creative inquiry methods, resources, and current activities in a seminar format. To be taken Pass/Fail only.

I E 280 Methods of Operational Research I 3(3,0) Introduction to operations research models, including linear programming, integer linear programming, transportation and assignment problems, and network flows. *Preq:* MTHSC 106.

I E H300 Junior Honors Seminar 1(1,0) Acquaints students enrolled in the Departmental Honors Program with current research issues in the profession. This assists students in preparing a research proposal for the senior thesis. *Preq:* Junior standing, admission to Departmental Honors Program.

I E 360 Industrial Applications of Probability and Statistics 3(3,0) Axioms of probability, discrete and continuous distributions, and sampling distributions applied to industrial engineering applications. Engineering applications of statistical estimation, hypothesis testing, and confidence intervals. *Preq:* MTHSC 206.

I E 361 Industrial Quality Control 3(3,0) Quality engineering techniques focusing on process control using statistical methods including control charts and acceptance sampling. *Preq:* I E 360.

I E 368 Professional Practice in Industrial Engineering 1(1,0) Seminar to orient students to issues of professional development and professional practice of industrial engineering.

I E 381 Methods of Operational Research II 3(3,0) Probabilistic modeling of engineering systems. Topics include calculus-based probability, decision analysis, Markov processes, queueing, and reliability. *Preq:* I E 280, 360.

I E 384 Engineering Economic Analysis 3(3,0) Basic principles and techniques of economic analysis of engineering projects. Consideration of time, value of money, short- and long-term investments, replacement analysis, depreciation methods, cost allocation, and measures of cost effectiveness. *Preq:* MTHSC 108.

I E 386 Production Planning and Control 3(3,0) Fundamentals of forecasting demand, scheduling production, and controlling the movement and storage of material associated with production are studied. State-of-the-art manufacturing techniques are discussed. *Preq:* I E 280, ENGR 141.

I E H400, 600 Honors Thesis 1-6(1-6,0) Individual or joint research project performed with a faculty mentor or committee of faculty. May be repeated for a maximum of six credits. *Preq:* I E H268 and consent of mentor.

I E 402 Creative Inquiry Research 1-6(1-6,0) Research experience promoting reasoning, critical thinking, ethical judgment, communication skills, and an understanding of the scientific method and engineering design. These applied/basic research experiences are usually undertaken with a team under the mentorship of a faculty member or advanced graduate student. May be repeated for a maximum of six credits. *Preq:* Consent of mentor.

I E 403 Creative Inquiry Project 1-3(1-3,0) Project-oriented experience promoting reasoning, critical thinking, ethical judgment, communication skills, and an understanding of the scientific method and engineering design. Typical experiences include design projects in cooperative education or sponsored student competitions undertaken with a team, under the mentorship of a faculty member or advanced graduate student. May be repeated for a maximum of three credits. *Preq:* I E 268 and consent of mentor.

I E 418, 618 Human Factors Accident Analysis and Expert Testimony 3(3,0) This highly interactive course is divided into two components. Students gain an understanding of how the principles of human factors engineering are used in accident investigation and forensic analysis, and then learn the skills necessary to defend their opinions as an expert witness. *Preq:* COMM 150 or 250; I E 210.

I E 430, 630 Introduction to Healthcare Systems Engineering 3(3,0) Focuses on how industrial engineers can partner with healthcare professionals to improve the quality and efficiency of healthcare delivery. Students learn about the current healthcare system, how healthcare is different from traditional industrial engineering sectors, and the experiences of individuals in healthcare from engineering and non-engineering disciplines. *Preq:* I E 361 and 386; or MGT 402 and 404.

I E 440, 640 Decision Support Systems in Industrial Engineering 3(2,3) Study of design of decision support systems for production and service systems based on operations research models. Includes use of spreadsheets, databases, and integrated software development environments to implement decision support systems. *Preq:* I E 280, ENGR 141.

I E (MGT) 444 International Perspectives in Industrial Management 1-6(1-6,0) See MGT 444.

I E 452, 652 Reliability Engineering 3(3,0) Probabilistic approach to assessing system reliability. Methods for analyzing serial, parallel, and complex systems. Reliability life testing and its acceleration are covered. Essential elements of maintainability are identified and related to system availability. *Preq:* I E 360.

I E 456, 656 Supply Chain Design and Control 3(3,0) Industrial engineering aspects of supply chains, including design and control of material and information systems. *Preq:* I E 386.

I E 457, 657 Transportation and Logistics Engineering 3(3,0) Introduces transportation and logistics systems analysis from both analytical and practical perspectives. Covers methods for identifying level-of-service metrics and measuring system performance. Discusses key aspects of modeling, simulation, and other techniques for economic and quantitative analysis of transportation and logistics planning issues. *Preq:* Senior standing in engineering, science, or management program; MTHSC 102 or 106.

I E 460, 660 Quality Improvement Methods 3(3,0) Study of modern quality improvement techniques presented in an integrated, comprehensive context. *Preq:* Junior standing.

I E 461, 661 Quality Engineering 3(3,0) Design aspects of quality and the engineer's role in problems of quality in production systems. *Preq:* I E 360.

I E 462, 662 Six Sigma Quality 3(3,0) Study of DMAIC (Define, Measure, Analyze, Improve, and Control) elements of Six Sigma, project management, process analysis, quality function deployment, hypothesis testing, gage R&R, data analysis, multivariate analysis, design of experiments, statistical process control, and process capability analysis. *Preq:* EX ST 301, 411, I E 360, MTHSC 301, 302, or 309.

I E 463, 663 Quality in the Capital Projects Industry 3(3,0) Covers topics in quality and lean principles relevant to the capital projects industry. Provides a broad overview on quality concepts and philosophies, quality management and inspection tools applicable to capital projects, Six Sigma Approach, lean concepts and value stream mapping. *Preq:* MTHSC 206.

I E 465, 665 Facilities Planning and Design 3(3,0) Study of the principles and techniques of facility planning and design. Discusses economic selection of materials handling equipment and integration of this equipment into the layout plan to provide effective product flow in production, distribution, and service contexts. Includes quantitative techniques for evaluation of facility design. *Preq:* I E 210, 280, 381.

I E 467 Systems Design II 3(2,3) Provides students with the challenge of integrating and synthesizing general engineering knowledge into creatively solving real-world, open-ended problems. This includes developing the problem statement, objectives, and criteria; data collection; technical analysis; developing and integrating recommendations; and presenting results. *Preq:* All required industrial engineering courses in the Industrial Engineering curriculum.

I E 469 Creative Inquiry Symposium in Industrial Engineering 1(1,0) Provides a forum for exchange of results and ideas in creative inquiry student projects. To be taken Pass/Fail only. *Preq:* I E 368.

I E 482, 682 Systems Modeling 4(3,2) The purpose, theory, and techniques of modeling systems with dynamic events. Students learn a powerful analytical process to use in the analysis and improvement of systems in several industries, including transportation, logistics, manufacturing and service systems. Incorporates professional simulation software as a tool in evaluating the system performance. *Preq:* I E 381.

I E 485, 685 Industrial Systems Engineering 3(3,0) Modeling and analysis of multistage decision processes, recursive optimization, process and system design, and control problems. *Preq:* I E 280, 381.

I E 487, 687 Industrial Safety 3(3,0) Recognition and prevention of hazards; recognition and control of hazardous materials; developing and managing a safety program; designing inherently safe equipment and workplaces. *Preq:* Junior standing.

I E 488, 688 Human Factors Engineering 3(3,0) Introduction to human performance and limitations in the design of effective and efficient systems. Covers issues related to changes in technology, impact of design on society, ethical issues in design of systems, and the cost benefits from designing systems and environments that often challenge perceived notions of benefits. *Preq:* Junior standing; MTHSC 102 or 106.

I E 489, 689 Industrial Ergonomics and Automation 3(2,3) Physical ergonomics and ergonomics in industrial settings, including work physiology, the physical environment, automated systems, and hybrid work systems. *Preq:* I E 210 or Senior standing.

I E 491, H491, 691 Selected Topics in Industrial Engineering 1-3(0-3,0-9) Comprehensive study of any timely or special topic in industrial engineering not included in other courses. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

INTEGRATED PEST MANAGEMENT

Professor: R. G. Bellinger

I P M 401, 601 Principles of Integrated Pest Management 3(3,0) Origins, theory, and practice of integrated pest management. Relationships among crop production and protection practices are explored. Economics of various control strategies are considered. Integrated pest management field projects are studied. Conventional and integrated pest management approaches are compared. Multidisciplinary plant problem analysis is introduced. *Preq:* CSENV 407, ENT 301, PL PA 310, or consent of instructor.

INTERNATIONAL STUDIES

I S 101 Cross-Cultural Awareness International Experience 0 Study of cross-cultural awareness as part of an international/study abroad experience. Minimum duration of the study abroad experience is four weeks. May be repeated. To be taken Pass/Fail only.

I S 210 Selected Topics in International Studies 3(3,0) Topics in cross-cultural awareness and intercultural communications are studied in situ as part of a study abroad program. Addresses the impact of culture on behavior in intercultural contact in professional and personal contexts. May be repeated for a maximum of six credits, but only if different topics are covered.

ITALIAN

Professor: B. M. Zaczek; *Assistant Professor:* L. Barattoni; *Lecturers:* L. Borgorallo, J. Schmidt

ITAL 101 Elementary Italian 4(3,1) Introductory course stressing grammar, pronunciation, oral practice, and reading skills. Attention is given to practical everyday living as well as cultural considerations.

ITAL 102 Elementary Italian 4(3,1) Continuation of ITAL 101. *Preq:* ITAL 101 or consent of instructor.

ITAL 201, H201 Intermediate Italian 3(3,1) Intermediate course to build on the foundation of previous language courses, with practice in listening, speaking, reading, and writing. Introduction to cultural perspectives through readings of literary prose selections. *Preq:* ITAL 102.

ITAL 202, H202 Intermediate Italian 3(3,1) Increasingly difficult readings in Italian literature, supplemented with classroom discussions and compositions. *Preq:* ITAL 201.

ITAL 297 Creative Inquiry—Italian 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Arrangements with faculty members must be established prior to registration.

ITAL 301 Introduction to Italian Literature 3(3,0) Study of selected texts of Italian literature in their artistic, cultural, and social context. May include theme and genre studies. *Preq:* ITAL 202 or consent of department chair.

ITAL 302 Modern Italian Literature 3(3,0) Study of selected works from major 19th and 20th century Italian authors, including Manzoni, Verga, Svevo, Moravia, Ginzburg. *Preq:* ITAL 202 or consent of department chair.

ITAL 305 Intermediate Italian Conversation and Composition 3(3,0) Practice in the written and spoken language with emphasis on vocabulary, pronunciation, and comprehension. *Preq:* ITAL 202 or consent of department chair.

ITAL 307 Italian Civilization and Culture 3(3,0) Study of the significant aspects of Italian civilization and culture through analysis of literary texts, paintings, films, and magazine articles. *Preq:* ITAL 202 or consent of department chair.

ITAL 360 Italian Literature to 1600 3(3,0) Examines selected topics in Italian literature from the Middle Ages to 1600. Readings include works by Dante, Boccaccio, Petrarca, Franco, Castiglione and Machiavelli. *Preq:* ITAL 302 or 305 (or concurrent enrollment in either) or consent of instructor.

ITAL 397 Creative Inquiry—Italian 1-4(1-4,0) Students focus on a special research area under the guidance of a faculty member. After acquiring the requisite background, students formulate hypotheses for a group project, develop a critical framework, and initiate research on a specific topic.

ITAL 398 Directed Reading 1-3(1-3,0) Directed study of selected topics in Italian literature, language, and culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.

ITAL 400 Image of an Italian City 3(3,0) Study of historical, social, and architectural images of Italian cities through analysis of literary texts and films. *Preq:* ITAL 202 or consent of instructor.

ITAL 405 Advanced Italian 3(3,0) Advanced language study emphasizing fluency in oral and written expression through discussion and analysis of contemporary Italian media. *Preq:* One 300-level Italian course or consent of instructor.

ITAL 455 Italian Film 3(2,3) Overview of Italian cinema. Topics may include history, genres, and major directors. *Preq:* ITAL 305 or consent of instructor.

ITAL 475 Advanced Italian Seminar 3(3,0) Concentrated research and discussion on advanced topics in Italian literature, film, art, or drama. May be repeated for a maximum of six credits. *Preq:* One 400-level Italian course or consent of instructor.

ITAL 497 Creative Inquiry—Italian 1-4(1-4,0) Continuation of research initiated in ITAL 397. Students complete their project and disseminate their research results. *Preq:* ITAL 397 or consent of instructor.

ITAL 498 Selected Topics 3(3,0) Study of selected topics in Italian literature, language, and culture. Taught in Italian. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of department chair.

JAPANESE

Associate Professors: T. Kishimoto, E. L. Williams;
Lecturer: Y. Kihara

JAPN 101 Elementary Japanese 4(3,1) Course for beginners in which fundamentals are taught and a foundation is provided for further study and the eventual ability to read and speak the language. The Japanese writing system is introduced. Students learn how to recognize and write the two alphabets Hiragana and Katakana. Three hours a week of classroom instruction and one hour a week in the language laboratory.

JAPN 102 Elementary Japanese 4(3,1) Continuation of JAPN 101. Students study Kanji characters. *Preq:* JAPN 101.

JAPN 201 Intermediate Japanese 3(3,1) Brief review of JAPN 101 and 102, with conversation, composition, and beginning of more serious reading of Japanese in short stories. Students study Kanji characters. *Preq:* JAPN 102.

JAPN 202 Intermediate Japanese 3(3,1) Brief review of JAPN 201, with conversation, composition, and dictation based on more difficult Japanese reading selections. Includes a continuation of Kanji characters. *Preq:* JAPN 201.

JAPN 297 Creative Inquiry—Japanese 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Arrangements with faculty members must be established prior to registration.

JAPN 303 Intensive Conversation and Composition in Japan 3(3,0) Study of Japanese with native instructors at a university in Japan. All coursework conducted in Japanese. May be repeated for a maximum of six credits. *Preq:* JAPN 202 or consent of instructor.

JAPN 305 Japanese Conversation and Composition 3(3,0) Practice in the spoken language with emphasis on vocabulary, Kanji, pronunciation, and comprehension; learning practical language skills and intercultural communication through various topics. *Preq:* JAPN 202 or consent of department chair.

JAPN 306 Japanese Conversation and Composition 3(3,0) Continuation of JAPN 305. More practice in the spoken language emphasizing vocabulary, Kanji, pronunciation, and comprehension. Learning practical language skills and intercultural communication through various topics. *Preq:* JAPN 305 or consent of department chair.

JAPN 307 Japanese Civilization I 3(3,0) Study of the significant aspects of the culture of Japan. *Preq:* JAPN 202 or consent of department chair.

JAPN 308 Japanese Civilization II 3(3,0) Study of significant aspects of the culture of Japan. *Preq:* JAPN 202 or consent of department chair.

JAPN 316 Japanese for International Trade I 3(3,0) Spoken and written Japanese common to the Japanese-speaking world of business and industry emphasizing business practices and writing and translating business letters and professional reports. Cross-cultural references provide opportunity for comparative and contrastive analysis of American and Japanese cultural patterns in a business setting. *Preq:* JAPN 306 or consent of department chair.

JAPN 397 Creative Inquiry—Japanese 1-4(1-4,0) Students focus on a special research area under the guidance of a faculty member. After acquiring the requisite background, students formulate hypotheses for a group project, develop a critical framework, and initiate research on a specific topic.

JAPN 398 Directed Reading 1-3(1-3,0) Directed study of selected topics in Japanese literature, language, and culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.

JAPN 401 Japanese Literature in Translation 3(3,0) Introduction to Japanese literature from 712 AD to the present. Cultivates an appreciation for Japanese literature and culture. All readings and discussions are in English. May not be used to satisfy general foreign language requirements.

JAPN 403 Internship in Japan 3(3,0) Minimum of one month of full-time work experience in Japan. All work activities with host companies are conducted in Japanese. May be repeated for a maximum of six credits. *Preq:* JAPN 202 or consent of instructor.

JAPN 404 Cultural Studies in Japan 3(3,0) Study of Japanese cultural topics on site in Japan through lectures, field trips, small student group reconnaissance excursions, and reporting sessions. All activities are conducted in Japanese. May be repeated for a maximum of six credits. *Preq:* JAPN 202 or consent of instructor.

JAPN 406 Introduction to Japanese Literature 3(3,0) Students read contemporary Japanese narrative fiction, poetry, and drama in their historical and social context. *Preq:* 300-level Japanese course or consent of department chair.

JAPN 411 Studies in the Japanese Language I 3(3,0) Advanced training in the spoken and written language with emphasis on formal expressions. *Preq:* JAPN 306 or consent of department chair.

JAPN 412 Studies in the Japanese Language II 3(3,0) In-depth study of Kanji characters. *Preq:* JAPN 411 or consent of department chair.

JAPN 416 Japanese for International Trade II 3(3,0) Study of language and cultural environment of the Japanese-speaking market, including the linguistic and cultural idioms that support global marketing in general and the international marketing of textiles, agricultural products, and tourism in particular. *Preq:* JAPN 316 or consent of department chair.

JAPN (ANTH) 417 Japanese Culture and Society 3(3,0) Focuses on basic themes in Japanese culture found in social interaction and ritual behavior. Japanese social organization, including marriage and family patterns, neighborhood and community organization, and gender roles receive extensive attention. All readings and discussions are in English. May not be used to satisfy general foreign language requirements.

JAPN 490 Classical Japanese 3(3,0) Examination and analysis of premodern Japanese texts. Special emphasis is on the grammar and syntax of the classical language, its divergence from and influence upon the modern idiom. All coursework is conducted in Japanese. *Preq:* JAPN 306 or consent of instructor.

JAPN 491 Senior Seminar in Japanese Literature 3(3,0) Close readings of various works of premodern and modern Japanese literature. Includes study of important authors and their representative works in prose and poetry. Familiarizes students with the cultural and linguistic nuances of literature in the original language. All readings and activities are in Japanese. *Preq:* JAPN 306.

JAPN 497 Creative Inquiry—Japanese 1-4(1-4,0) Continuation of research initiated in JAPN 397. Students complete their project and disseminate their research results. *Preq:* JAPN 397 or consent of instructor.

JAPN 499 Selected Topics in Japanese Culture 3(3,0) Topic-generated examination of fundamental cultural themes in premodern and modern Japan, including, but not limited to, such topics as Japanese drama, poetry, prose, religious traditions, cinema, and folklore/mythology. May be repeated for a maximum of six credits, but only if different topics are covered. Readings and discussions are in English. May not be used to satisfy general foreign language requirements.

LANDSCAPE ARCHITECTURE

Professors: F. F. Chamberlain, D. L. Collins, D. J. Nadenicek, *Chair*; *Associate Professor:* S. Burmil, U. Yilmaz; *Assistant Professor:* C. L. Goetcheus; *Visiting Assistant Professor:* R. R. Hewitt; *Lecturers:* R. W. Bainbridge, C. L. K. Martin

LARCH 116 History of Landscape Architecture 3(3,0) History of design on the land from prehistory to the present. Overview of the interface of aesthetics, science, technology, and natural features that influence cultures in shaping places.

LARCH 128 Technical Graphics 3(2,2) Introduction to rendering techniques, plan graphics, 3-D projection drawings, drafting skills, perspective drawing, and overview of computer graphics. *Preq:* Landscape Architecture major.

LARCH 151 Basic Design I 3(0,6) Studio introduction to design fundamentals through 2-D and 3-D application of basic systems and development of attitudes essential to the creative design process. *Preq:* Landscape Architecture major.

LARCH 152 Basic Design II 3(0,6) Further investigations into design fundamentals through 2-D and 3-D application of basic systems and development of attitudes essential to the creative design process. *Preq:* LARCH 151.

LARCH 199 Creative Inquiry—Landscape Architecture I 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration.

LARCH 251 Landscape Architecture Design Fundamentals 6(1,10) Compositional skills introduced in LARCH 151 and 152 are applied to design in the landscape. Through research, design assignments and discussions, students derive and apply design principles to place, study the processes of design and develop an understanding of how design principles, plant materials and structures are used in the landscape. *Preq:* LARCH 152 or consent of instructor.

LARCH 252 Site Design in Landscape Architecture 6(1,10) Students apply lessons from LARCH 251 to site designs considering planting design, responsible land management strategies and appropriate use of materials. Also included are participatory and social behavioral aspects of design. Readings and seminar discussions are emphasized as integral to the design and decision making process. *Preq:* LARCH 251 or consent of instructor.

LARCH 262 Design Implementation I 3(1,3) Basics of landscape architecture construction methods and construction documents, including site information gathering and analysis, basic site grading and drainage, cut and fill, principles of stormwater management, and sustainable land management related to implementation. Includes explorations in hand and computer graphic techniques used in construction drawings. *Preq:* Consent of instructor.

LARCH 293 Field Studies Internship 1-3(0,3-9) Skill-based practical work experience to give beginning students on-the-job learning opportunities. Requires a minimum of five weeks of uninterrupted, supervised, practical experience with a preapproved commercial firm or public agency dealing with landscape architectural site issues. May be repeated for a maximum of six credits. To be taken Pass/Fail only. *Preq:* Consent of instructor.

LARCH 299 Creative Inquiry—Landscape Architecture II 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. *Preq:* LARCH 199.

LARCH 351 Regional Design and Ecology 6(1,10) Study and analysis of natural and cultural landscapes at the regional scale. Introduction of landscape ecology as an informant to design. Basic overview of geographic information systems. Regional and ecological issues are applied in a final site design. Also includes relevant reading, discussion, and writing. *Preq:* LARCH 252 or consent of instructor.

LARCH 352 Urban Design Studio 6(1,10) Landscape architectural design in the urban context. Students study urban issues and offer design and sustainable management solutions for urban areas. Includes readings and theory component as well as an opportunity to collaborate with architecture students. *Preq:* LARCH 351 or consent of instructor.

LARCH 362 Design Implementation II 3(1,2) Advanced landscape architecture construction methods and construction documents, including site information gathering, analysis, site grading and drainage, cut and fill, principles of stormwater management, sustainable land management related to implementation, materials research and use, sustainable planting strategies, site demolition and construction management. Includes explorations in appropriate graphic communication techniques. *Preq:* Consent of instructor.

LARCH 399 Creative Inquiry—Landscape Architecture III 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. *Preq:* LARCH 299.

LARCH 405, 605 Urban Genesis and Form 3(3,0) Exploration of urban forms and developments within their historical context through off-campus, on-site lectures and exposure to historic cities and sites. Students visit historic and contemporary cities and analyze those places through readings and direct observations. Offered Maymester only. *Preq:* LARCH 252 or consent of instructor.

LARCH 413 Professional Development 3(2,2) Study of the various employment opportunities in the profession through a series of organized and intensive lab-based workshops with professionals and discussions of business law and operating procedures. In-depth exploration of one realm of practice. *Preq:* Landscape Architecture major or consent of instructor.

LARCH 418 Off-Campus Study Seminar 1(1,0) Students study various cultural and environmental factors to inform and enhance their off-campus experiences in Istanbul, Barcelona, Genoa, or Charleston. *Preq:* Landscape Architecture major or consent of instructor.

LARCH 419 Off-Campus Field Study 3(3,0) Intensive study of place in an off-campus setting as context for design. Numerous class trips to significant sites in the area of the off-campus programs. Bus trips to distant sites are also planned. *Preq:* LARCH 451 or consent of instructor.

LARCH 421 Landscape Architectural Seminar 3(3,0) Lectures and seminars dealing with pertinent topics related to environmental, technological, and theoretical issues in landscape architecture, land planning, and urban design. May be repeated for a maximum of six credits. *Preq:* Senior standing or consent of instructor.

LARCH 423, 623 Environmental Issues in Landscape Architecture 3(3,0) Overview of environmental and ecological issues and their relationship to landscape architecture practice and design. *Preq:* LARCH 452 or consent of instructor.

LARCH 428 Landscape Architecture Computer-Aided Design 3(2,2) Introduces students to the use of computer technology in the landscape architectural design process. Covers the basics of computer applications used in the industry for conceptualizing, drafting, modeling, and graphic communications. *Preq:* Landscape Architecture major or consent of instructor.

LARCH 433, 633 Historic Preservation in Landscape Architecture 3(3,0) Study of historic landscape preservation in a number of contexts, including gardens, vernacular landscapes, parks, cemeteries, and battlefields. *Preq:* LARCH 452 or consent of instructor.

LARCH 438 Advanced Computer-Aided Design 3(2,2) Advanced study in computer-aided design for students wishing to develop their skills beyond LARCH 428. Students develop advanced skills in illustrative drawings, construction drawings, desktop publishing, and other computer-based applications. *Preq:* LARCH 428 or consent of instructor.

LARCH 443, 643 Community Issues in Landscape Architecture 3(3,0) In-depth study of issues relevant to community design. Overview of physical design and related social issues. *Preq:* LARCH 452 or consent of instructor.

LARCH 451 Community Design Studio 6(1,10) Studio focused on the study and design of communities and public spaces. Students explore multicultural, historical and ecological layers of community, as well as the role of landscape management and the creative design process to add new dimensions of meaning to these places. *Preq:* LARCH 352 or consent of instructor.

LARCH 452 Off-Campus Studio 6(1,10) Off-campus landscape architecture studio in Istanbul, Charleston, Genoa, or Barcelona. *Preq:* LARCH 451 or consent of instructor.

LARCH 453, 653 Key Issues in Landscape Architecture 3(3,0) Overview of research in landscape architecture and study of relevant research methods. Students write proposals for their own projects positioned within the larger context of research in the profession. *Preq:* Fifth-year Landscape Architecture student or consent of instructor.

LARCH 462 Landscape Architectural Technology III 3(2,2) Advanced overview of construction materials and methods used in project implementation. Study characteristics, strengths, nominal sizes and uses of materials (asphalt, brick, concrete, stone, wood). Field trips, exercises, and preparation of construction documents develop understanding of how design ideas are realized in built form. *Preq:* LARCH 362.

LARCH 490 Directed Studies and Projects in Landscape Architecture 1-5(1-5,0) Comprehensive studies and/or research of special topics not covered in other landscape architecture courses. May be repeated for a maximum of ten credits. *Preq:* Consent of instructor.

LARCH H491 Honors Research Methods for Landscape Architecture 1-3(1-3,0) Students investigate various research methodologies in landscape architectural design or related areas and apply to student generated project(s). Students generate a proposal for Landscape Architecture Honors Research. *Preq:* Junior standing; membership in Calhoun Honors College, consent of Department Honors Program Advisor.

LARCH 493 Professional Office Internship 1-3(0,3-9) Office experience for advanced students. On-the-job learning requires a minimum of five uninterrupted sequential weeks of employment under the direct supervision of a preapproved registered landscape architect, architect, urban planner, or civil engineer. May be repeated for a maximum of six credits. To be taken Pass/Fail only. *Preq:* LARCH 352, 362, consent of instructor.

LARCH H494 Landscape Architecture Honors Research 2-3(2-3,0) Independent, student-generated research on a preapproved topic conducted under the supervision and weekly guidance of a faculty member. Second in a sequence of three required courses for students enrolled in Departmental Honors Program. Written interim report and presentation to faculty and honors students are required before the end of the semester. May be repeated for a maximum of six credits. *Preq:* LARCH H491, membership in Calhoun Honors College.

LARCH H495 Landscape Architecture Honors Thesis 2-3(2-3,0) Continuation of independent research, conducted under the supervision and weekly guidance of a faculty member. Third in a sequence of three required courses for students enrolled in Departmental Honors Program. Written thesis is submitted and presented before the end of the semester to qualify for Departmental Honors. *Preq:* LARCH H494.

LARCH 499 Creative Inquiry—Landscape Architecture IV 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. *Preq:* LARCH 399.

LARCH 503 Landscape Architecture Portfolio 3(3,0) Presentation of the concepts of conventional portfolios, as well as electronic portfolios, both of which are designed to record and communicate students' academic experiences and achievements. The role of a portfolio within the landscape architecture profession is emphasized through lectures, demonstrations and presentations.

LARCH 551 Landscape Architecture Design V 3(1,10) Studio work and adjunct lectures featuring complex problem-solving projects involving regional design analysis and planning, city planning and urban design, complex building relationships and intense site utilization in an urban setting. Studio may be taken in Charleston, Genoa, or Barcelona. *Preq:* LARCH 452.

LARCH 552 Landscape Architecture Exit Project 6(0,12) Studio work on student-selected professional level exit project including design-build project or substantive research project. Exit studio synthesizes and builds on skills developed throughout the Landscape Architecture program. Also provides opportunities for students to inquire into areas of interest not otherwise covered. *Preq:* LARCH 452.

LARCH 562 Landscape Architectural Technology IV 2(0,4) Studio course for the integration of design and technology. *Preq:* LARCH 462, professional standing. *Coreq:* LARCH 552.

LARCH 581 Landscape Architectural Professional Practice 3(3,0) Lectures dealing with general consideration of landscape architectural office procedures. Study of the professional relationships of the landscape architect to client and contractor including problems of ethics, law, and business. *Preq:* Professional standing or consent of instructor.

LANGUAGE

LANG 297 Creative Inquiry—Language 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Arrangements with faculty members must be established prior to registration.

LANG 300 Introduction to Linguistics and Foreign Language Learning 3(3,0) Introduction to the field of linguistics, including the study of phonetics, phonology, morphology, syntax, and semantics. Includes discussion of issues pertaining to foreign language acquisition.

LANG 303 Study Abroad Transfer 3-6(3-6,0) Course for credit transfer of any course taken abroad during a department-approved study. Requires a minimum of two contact hours per week for at least 15 weeks or equivalent. Students may take a course outside their concentration. May be repeated for a maximum of six credits. To be taken Pass/Fail only. *Preq:* Consent of department chair.

LANG 340 Cosmopolis: The Myth of the City 3(3,0) Cross-cultural inquiry into the idea of the city through literary, political, and philosophical texts as well as film and architecture. *Preq:* Junior standing or consent of instructor.

LANG 342 Sacred and Profane Bodies 3(3,0) Cross-cultural inquiry into the ambivalence surrounding female sexuality implicit in images of women and, in particular, the division of women into "earthly" and "divine" categories. *Preq:* Junior standing or consent of instructor.

LANG 346 Walking and the Road 3(3,0) Cross-cultural inquiry into the epistemological, political, and aesthetic questions generated by walkers and the roads they travel in literature, philosophy, and film. *Preq:* Junior standing or consent of instructor.

LANG 348 The Child and the Adolescent 3(3,0) Cross-cultural inquiry into important theoretical questions of personal and political identity raised by the figure of the child and the adolescent in literature and film. *Preq:* Junior standing or consent of instructor.

LANG (POSC) 350 Seminar in International News 3(3,0) Review of current news of significance for the world and for U.S. foreign policy through authentic sources such as foreign newspaper, television/radio broadcasts, and the Internet. Student-led discussions in the target language groups (i.e. French, German, Spanish) are supplemented by joint debates in English from global perspectives. May be repeated for a maximum of six credits. *Preq:* FR 202, GER 202, SPAN 202, or consent of department chair.

LANG 356 Faces of Evil 3(3,0) Cross-cultural inquiry into evil as an ineradicable challenge to representation disclosed by notions of the monstrous, the enemy, the infinite, and death in literature, cultural theory, and the arts. *Preq:* Junior standing or consent of instructor.

LANG (ANTH) 371 Language and Culture 3(3,0) Surveys key topics, theories, and methodological approaches in linguistic anthropology. Examines the complex relationships among language, culture, and communicative behavior and provides students with conceptual tools that inform the study of language in its cultural contexts.

LANG 397 Creative Inquiry—Language 1-4(1-4,0) Students focus on a special research area under the guidance of a faculty member. After acquiring the requisite background, students formulate hypotheses for a group project, develop a critical framework, and initiate research on a specific topic.

LANG 400, 600 Phonetics 3(3,0) Study of basic phonetic concepts used in the study of sounds in language.

LANG 401 China Study Abroad 3(3,0) Six-week intensive summer course on Chinese culture offered in China. Main topics include origin and history of Chinese language, Chinese nationalities, geography, architecture, arts, and social custom. All readings and discussions are in English. May be repeated for a maximum of six credits.

LANG 420, H420 France and the Francophone World 3(3,0) Selected masterpieces of French and Francophone Culture are considered within their historical and cultural context. All readings and instruction are in English. No knowledge of the foreign language is required. May be repeated for a maximum of six credits. *Preq:* Sophomore standing or consent of department chair.

LANG 450 Risk and Danger 3(3,0) Cross-cultural inquiry into the meanings of risk and danger as they are articulated in various literary and philosophical texts and films about gambling, duels, stunts, bullfights, wilderness adventure, and smoking. *Preq:* Junior standing or consent of instructor.

LANG (ENGL) 454 Selected Topics in International Film 3(2,3) Presents subtitled films of specific world cultures and basic film theory and discourse applicable to the selected areas. Taught in English. May be repeated for a maximum of six credits with consent of department chair. *Preq:* ENGL 310 or consent of instructor.

LANG 455 Hispanic Film: Documentary and Feature 3(3,0) Overview of theory and discourse on Hispanic film. Through lectures, discussions and films, students become acquainted with film as a vehicle for understanding the Hispanic World. Taught in English. Films are in Spanish with English subtitles. *Preq:* Sophomore standing or consent of department chair.

LANG 460 Propaganda and the Totalitarian Recreation of the World 3(3,0) Cross-cultural inquiry into the various languages (philosophical, political, literary, and filmic, among others) that form a crucial weapon in the striving for hegemony over desire that marks the modern totalitarian project. *Preq:* Junior standing or consent of instructor.

LANG 462 Borders 3(3,0) Cross-cultural inquiry into representations of physical and non-physical borders. Provides a theoretical framework in which various forms of borders, limits, and boundaries can be studied through literature and other artistic media. *Preq:* Junior standing or consent of instructor.

LANG (PO SC) 485, 685 Global Affairs and Governments 3(3,0) See PO SC 485.

LANG 497 Creative Inquiry—Language 1-4(1-4,0) Continuation of research initiated in LANG 397. Students complete their project and disseminate their research results. *Preq:* LANG 397 or consent of instructor.

LANG 499 Language Portfolio 2(2,0) Students create a digital portfolio to demonstrate competencies in reasoning, critical thinking, problem solving skills, cross-cultural awareness, ethical judgment, and to document a study abroad or internship experience. Course also serves as a resource for academic and professional development. To be taken Pass/Fail only.

LANGUAGE AND INTERNATIONAL HEALTH

L&IH 127 Introduction to Language and International Health 1(1,0) Survey of international health and related career opportunities, focusing on the two distinct emphasis areas of the major: community development and health administration. To be taken Pass/Fail only.

L&IH 297 Creative Inquiry—Language and International Health 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Arrangements with faculty members must be established prior to registration.

L&IH 397 Creative Inquiry—Language and International Health 1-4(1-4,0) Students focus on a special research area under the guidance of a faculty member. After acquiring the requisite background, students formulate hypotheses for a group project, develop a critical framework, and initiate research on a specific topic.

L&IH 400 Internship Abroad 3(3,0) One semester, full-time internship in a health care or a health administration setting abroad. To be taken Pass/Fail only. *Preq:* Second semester Junior standing or approval of Language and International Health director.

L&IH 497 Creative Inquiry—Language and International Health 1-4(1-4,0) Continuation of research initiated in L&IH 397. Students complete their project and disseminate their research results. *Preq:* L&IH 397 or consent of instructor.

LANGUAGE AND INTERNATIONAL TRADE

Professors: P. R. Heusinkveld, Director, C. K. Nakuma, Associate Dean; *Associate Professors:* T. Kishimoto, M. M. Rojas-Massei, J. Schmidt, G. E. Tissera, Y. Zhang; *Assistant Professor:* E. R. Touya; *Lecturers:* C. S. Edwards, L. J. Ferrell

L&IT 127 Introduction to Language and International Trade 1(1,0) Survey of the nature of international trade and related career opportunities. Information and applications of specific relevance to tourism, agriculture, and textile industries are offered. To be taken Pass/Fail only.

L&IT 297 Creative Inquiry—Language and International Trade 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Arrangements with faculty members must be established prior to registration.

L&IT 397 Creative Inquiry—Language and International Trade 1-4(1-4,0) Students focus on a special research area under the guidance of a faculty member. After acquiring the requisite background, students formulate hypotheses for a group project, develop a critical framework, and initiate research on a specific topic.

L&IT 400 Language and International Trade Internship 1-3 Mandatory internship with an international company in the U.S. or abroad. May be part-time or full-time during the summer or academic semester for a minimum of 140 hours. After completing the internship, students register for three credits of L&IT 400 and write a research paper in the target language. To be taken Pass/Fail only. *Preq:* CHIN 316, FR 316, GER 316, JAP 316 or SPAN 316; and twelve credit hours in a Language and International Trade technical option.

L&IT 402 Language and International Trade Directed Study 3 Directed study of an individual project in language and international trade. To be taken Pass/Fail only.

L&IT 497 Creative Inquiry—Language and International Trade 1-4(1-4,0) Continuation of research initiated in L&IT 397. Students complete their project and disseminate their research results. *Preq:* L&IT 397 or consent of instructor.

LATIN

LATIN 101 Elementary Latin 4(4,0) Course for beginners designed principally to teach the reading of the language.

LATIN 102 Elementary Latin 4(4,0) Continuation of LATIN 101.

LATIN 201 Intermediate Latin 3(3,0) Review of the fundamental principles of grammar in conjunction with readings from the Classical period. *Preq:* LATIN 102 or equivalent.

LATIN 202 Intermediate Latin 3(3,0) Continuation of LATIN 201 with the introduction of writings from the late Latin and Medieval periods. *Preq:* LATIN 201 or equivalent.

LAW

Associate Professors: F. L. Edwards, M. E. Mowrey; *Lecturers:* J. R. Jahn, V. L. S. Ward-Vaughn

LAW 322, H322 Legal Environment of Business 3(3,0) Examination of both state and national regulation of business. Attention is given to the constitution and limitations of power, specific areas in which governments have acted, and the regulations that have been imposed in these areas. *Preq:* Junior standing.

LAW 333 Real Estate Law 3(3,0) The nature of real property and means of acquiring rights therein: conveyance of ownership, creation and execution of deeds, mortgages, etc., landlord and tenant relationships, shared concepts, and government regulation.

LAW 399 Internship in Legal Studies 1-3 Faculty-supervised legal internship to give students learning opportunities that support their classroom experiences. Requires a minimum of six full-time weeks. Course enrollment and internship must occur in the same semester. Simultaneous credit cannot be received for another internship offering. May be repeated for a maximum of three credits. To be taken Pass/Fail only. *Preq:* Junior standing or consent of instructor.

LAW 405, 605 Construction Law 3(3,0) Provides a practical knowledge of legal principles applied to the construction process and legal problems likely to be encountered by practicing construction professionals. Topics include construction contracting, liability, claims and warranties, documentation, and responsibility and authority of contracting parties. *Preq:* LAW 322 or consent of instructor.

LAW 406 Sports Law 3(3,0) Provides awareness of sport-related legal issues. Topics include contracts, torts, arbitration, mediation, criminal liability, intellectual property, gender equity, disabilities, drug testing, and professional and amateur organizations. *Preq:* LAW 322, Senior standing.

LAW 420, 620 International Business Law 3(3,0) Intensive examination of the historical background of modern public and private international law; selected issues of public international law—human rights, law of war, United Nations' system, and international litigation; selected issues of private international law—international sales, international trade, and formation and operation of multinational businesses. *Preq:* LAW 322 or consent of instructor.

LAW 499 Selected Topics 1-3(1-3,0) In-depth examination of timely topics in legal studies. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Senior standing and consent of instructor.

LEISURE SKILLS

Lecturer: D. M. Anderson

L S 100 Selected Topics 1(0,3) Presentation of leisure skills not covered in other courses. May be repeated for a maximum of three credits, but only if different topics are covered.

L S 101 Challenge Recreation Activities 1(1,0) Encourages students to broaden their leisure skills and improve self-image through challenge activities. Classroom instruction stresses how to get started safely in flying, scuba, canoeing, skiing, windsurfing, mountaineering, hang-gliding, ballooning, and other challenge activities.

L S 111 Lapidary Arts 1(0,3) Students learn the techniques used to transform raw materials such as gemstones, minerals, gold, and silver into objects of art—primarily jewelry.

L S 113 Wood Carving 1(0,3) Introduction to the art of wood carving. Students learn about types of wood, tools, carving, and shop safety.

- L S 125 Budget Travel 1(0,3)** Teaches the necessary skills to travel internationally on a budget. Students learn how to get the best airtares, research destinations, and build an itinerary. Packing, security, local transportation, and culture/reverse-culture shock are also discussed.
- L S 126 Group Initiatives 1(0,2)** Students learn to lead people in group initiatives, also called team building exercises, with the goal of developing trust, cooperation, risk-taking, and leadership among participants. Students learn specific initiatives to lead, as well as how to bring groups to their intended goals.
- L S 133 Women's Shotgun Shooting 1(0,3)** Introduces basic shotgun shooting skills and firearm safety. Topics include gun fitting, skeet and trap shooting, and gun and range safety. Course is designed to provide women a comfortable environment in which to learn the necessary skills to participate in shotgun shooting.
- L S 134 Women's Hunting Traditions 1(0,3)** Students receive hands-on instruction in shooting sports and the sport of hunting. Students are introduced to the safe and responsible use of firearms and archery, and learn how to participate safely in hunting.
- L S 141 Top Rope Climbing 1(0,3)** Basic rock climbing skills, including philosophy, safety, knots, climbing techniques, site and supplies selection, and nature/conservation issues are covered.
- L S 143 Mountain Biking 1(0,3)** Introduces the sport of mountain biking; guides students on techniques and procedures to plan and undertake rides. Covers both on-trail and off-trail bike mechanics used to keep bikes in proper working order.
- L S 144 Performance Cycling 1(0,3)** Provides aspiring cyclists with all the information necessary to be safe and successful cyclists. Students learn how to ride safely on open roadways, group riding skills, bike maintenance, and bike mechanics.
- L S 145 Camping and Backpacking 1(0,3)** Basic camping and backpacking skills including map and compass reading, outdoor cooking, camping hazards and safety, site selections, and trip planning.
- L S 147 Alpine Skiing 1(0,3)** Basic downhill snow skiing instruction including equipment selection, safety, and maintenance; parallel turns; edging; carved and linked turns; wedeling; and safety and etiquette. There is an additional fee for this course. Taught during Christmas recess. (Contact the Department of Parks, Recreation and Tourism Management in October.)
- L S 149 Snowboarding 1(0,1)** Basic snowboarding instruction including equipment selection; safety; conditioning; and skills such as stopping, techniques for turning, and riding lifts. There is an additional fee for this course. Taught during Christmas recess. (Contact the Department of Parks, Recreation and Tourism Management in October.) May not be taken concurrently with L S 147 or 347.
- L S 156 Riflery 1(0,3)** Introduces the basics of rifle shooting and firearm safety. Students progress from beginning rifle shooting to more advanced topics such as reloading, external ballistics, and long-range shooting.
- L S 157 Shotgun Shooting 1(0,3)** Introduces students to basic shotgun shooting skills and firearm safety. Topics include gun fitting, chokes, gauges, ammunition, and different shotgun disciplines such as skeet, trap shooting, and sporting clays.
- L S 158 Archery 1(0,3)** Introduces students to the basic principles and skills of archery and helps them develop proper shooting form and marksmanship.
- L S 159 Hunting Traditions 1(0,3)** Basic, hands-on instruction in the shooting sports (shotgun, rifle, and archery) and the sport of hunting. Designed to introduce students to the safe and responsible use of firearms and archery equipment and safe hunting practices. Students are required to complete the South Carolina Department of Natural Resources Hunter Education certification.
- L S 161 Turkey Hunting 1(0,3)** Exposes students to the skills, techniques, and history of turkey hunting. Students learn gun and hunting safety; shotgun, muzzleloading, and archery hunting techniques; tracking; and basic calling techniques.
- L S 164 Whitewater Kayaking 1(0,3)** Flat-water and whitewater skills, techniques, safety, rescue, equipment selection and maintenance, and selection of routes/trips to participate in basic white-water kayaking. *Preq:* Basic swimming skills.
- L S 165 Inland Kayak Touring 1(0,3)** Introduction to basic skills necessary for safe enjoyment of flat-water (non-tidal waters: lakes, slow moving rivers) kayak touring. Students learn equipment selection, strokes, safety, and rescue techniques. *Preq:* Demonstrated swimming competence.
- L S 167 Canoeing 1(0,3)** Basic instruction in the nomenclature, strokes, and safety techniques in canoeing. *Preq:* Basic swimming skills.
- L S 169 Sailing 1(0,1)** Basic instruction in the nomenclature, safety and rescue techniques, and skills required to skipper sailing craft. *Preq:* Basic swimming skills.
- L S 171 Windsurfing 1(0,3)** Basic windsurfing instruction including rigging, launching, tacking, jibbing, rig and foot steering, safety, maintenance, equipment selection, rules-of-the-road, and racing techniques are covered. Offered Fall Break and first summer session. There is an extra fee for this course. *Preq:* Ability to swim 300 yards and tread water for five minutes.
- L S 173 Bass Fishing 1(0,3)** Provides basic knowledge and skills necessary to participate successfully in bass fishing.
- L S 175 Fly Fishing 1(0,3)** Introductory course in the techniques of fly-fishing. Students learn casting, fly-tying, and equipment selection.
- L S 176 Beginning Fly Tying 1(0,3)** The art of fly tying. Students learn basic fly tying techniques and gain a knowledge of materials and tools used in fly tying.
- L S 177 Saltwater Fly Tying 1(0,3)** Introduction to tying flies for saltwater applications of fly fishing.
- L S 179 Scuba 1 1(0,3)** Teaches basic open water diving techniques; prepares students to complete requirements for the open water diving certification. Certifications are granted by an internationally recognized and accepted certifying agency. *Preq:* Swim test required by certifying agency.
- L S 183 Introduction to Rugby 1(0,3)** Introduces students to the sport of Rugby. Covers history of the game, rules, and skills such as passing, kicking, and decision making.
- L S 185 Bowling 1(0,3)** Basic instructional program on techniques of bowling.
- L S 187 Frisbee Sports 1(0,3)** Focuses on the rules, history, and skills necessary for participating in various frisbee sports. Heavy emphasis is placed on Ultimate Frisbee and Frisbee Golf.
- L S 189 Tennis 1(0,3)** Fundamental course stressing rules, strokes, and strategy, with ample opportunity for practice.
- L S 194 Racquetball 1(0,3)** Basic skills, knowledge of rules, strategy, and basic strokes.
- L S 195 Intermediate Racquetball 1(0,3)** Builds on knowledge gained in L S 194. Students learn advanced swing mechanics, game strategy, and other advanced skills. *Preq:* L S 194 or equivalent skill.
- L S 196 Introduction to Billiards 1(0,3)** Introductory course in the history, rules, and skills necessary to participate in billiards. Students learn different types of games, proper shot techniques, and equipment selection.
- L S 198 Golf 1(0,3)** Fundamental course stressing rules, strategy, and basic strokes.
- L S 199 Intermediate Golf 1(0,3)** Builds on the knowledge gained in L S 198. Students learn to apply rules to common golf situations, improve ball striking, and course management. The skills and strategies taught are designed to improve existing golf scores. *Preq:* L S 198 or equivalent skill.
- L S 200 Traditional Sports 1(0,3)** Introductory course in the history, rules, and skills necessary to participate in traditional sports. Students learn about and participate in basketball, volleyball, football, and softball.
- L S 202 Field Hockey 1(0,3)** Introduces the fundamental skills, history, and rules of field hockey.
- L S 203 Lacrosse 1(0,3)** Introduces the fundamental skills, history, and rules of men's and women's lacrosse.
- L S 204 Soccer 1(0,3)** Introduces the history, rules, and fundamental skills of soccer.
- L S 210 Learn to Dance 1(0,2)** Students develop an understanding of the qualities of dance, recognize the importance of dance as a leisure pursuit, and learn to dance to difference types of music. Dances include shag, waltz, cha-cha, foxtrot, as well as current dance trends.
- L S 211 Introduction to Belly Dance 1(0,2)** Introduces students to the Middle Eastern belly dance. In addition to learning choreography and belly dance skills, students are introduced to the traditions and origins of Middle Eastern belly dance.
- L S 214 Modern Dance 1(0,3)** Introduction to modern dance techniques with emphasis on developing the style of movement and understanding the dance art form.
- L S 216 Contra Dance 1(0,2)** Introduces students to the social dance of Contra. Students learn the origin and history of Contra along with the basic dance steps and styles.

L S 218 Ballroom Dance 1(0,2) Students develop an understanding of advanced dance methods, learn about dance at social and competitive levels, and increase knowledge of a variety of both smooth and Latin steps. Dances include tango, cha-cha, waltz, foxtrot, and swing.

L S 219 Country Western Dance 1(0,2) Introduces traditional country western dance. Students learn traditional couples dances, line dances, and barn dances.

L S 220 Shag 1(0,2) Develops an understanding of the South Carolina state dance, its history and impact on the state. Students learn more advanced steps in shag, including bellyroll, sugarfoot, slide step, tiptoe up the ladder, pivot, and the thirteen steps.

L S 221 Intermediate Shag Dance 1(0,2) Builds on skills learned in L S 220. Students improve their ability to improvise, add style, and add many different moves to their dance vocabulary. *Preq:* L S 220.

L S 222 Advanced Shag 1(0,2) Exposes students to a competition level of shag. Students learn to break down a dance routine and to choreograph short routines. *Preq:* L S 221.

L S 227 Introduction to Swing Dance 1(0,2) Introduction to vintage swing dance created in the 1920s-1950s, including Charleston, Lindy Hop, Jitterbug, and optional acrobatic moves used in performance and competition.

L S 228 Intermediate Swing Dance 1(0,2) Builds on skills learned in L S 227 by improving students' ability to improvise, add style, musicality, and many additional moves to add to their dance vocabulary. *Preq:* L S 227.

L S 229 Advanced Swing Dance 1(0,2) Focuses on competition level and style of swing dance. Students learn to break down and teach a routine to beginners. Students also learn the skills necessary to create and choreograph a short routine. *Preq:* L S 228 or consent of instructor.

L S 231 Bosu 1(0,3) Introduces the group aerobic style of Bosu, which concentrates on physical stability, core strength, and general fitness.

L S 232 Core Stability Training 1(0,3) Teaches fundamentals of core training. Students learn basic anatomy, proper strength training, and how to design a program to fit their fitness goals.

L S 233 Aerobic Dance 1(0,3) Instruction in the development of skills for the safe improvement and maintenance of cardiovascular fitness, flexibility, and muscle tone utilizing dance movements and techniques.

L S 235 Basic Yoga 1(0,3) Develops flexibility, strength, sensitivity, energy, and a sense of relaxation through the study of basic yoga postures, conscious breathing, and meditation techniques.

L S 236 Power/Ashtanga Yoga 1(0,3) Power/Ashtanga Yoga is a comprehensive workout based on the Eastern philosophy of K. Pattabhi. Students learn the eight limbs of this philosophy and the rigorous series of postures that produce a high power, athletic workout with the purpose of detoxifying impurities in the body.

L S 237 Kripalu Yoga 1(0,3) Great emphasis is placed on learning breath work techniques to combine directly with the various kripalu yoga postures. The goal is to teach individuals the physiological reactions produced by this type of yoga in developing and restoring health.

L S 238 Vinyasa Flow Yoga 1(0,3) Explores the energetic, fluid movement of Yoga postures in sync with conscious breathing. Students study creative sequences using classical as well as innovative and advanced Yoga postures. *Preq:* L S 235 or consent of instructor.

L S 242 Meditation and Relaxation 1(0,2) Exposes students to the benefits of relaxation and meditation techniques. Students learn different techniques used to relieve stress and promote relaxation.

L S 245 Pilates 1(0,3) Study of the history, philosophy, and fundamental movement concepts of Pilates.

L S 251 Running and Jogging 1(0,3) Introduces the various components important to improving overall fitness level through a running or jogging activity. Topics include proper stretching exercises, nutrition, workout program design, and proper running techniques.

L S 258 Self Defense 1(0,3) Basic physical defense that incorporates risk avoidance and awareness techniques with basic physical defense options.

L S 264 Aikido 1(0,3) Introduces the modern Japanese martial art of Aikido.

L S 266 Hapkido 1(0,3) Introduces the fundamental skills and techniques of the self-defense based Korean martial art of Hapkido.

L S 270 Sports Officiating 1(0,3) Practical study of officiating for various sports. Includes studies and practical application of officiating rules and mechanics. Sports studied include football, basketball, softball, soccer, and introductions to a variety of other team sports.

L S 275 Red Cross First Aid/CPR 1(0,3) Gives students the knowledge and skills necessary to prevent, recognize, and provide basic care for infants, children, and adults with injuries and sudden illness.

L S 276 First Aid/CPR for the Professional 1(0,2) This American Red Cross CPRAED for the Professional Rescuer course teaches those with a duty to act the skills needed to respond appropriately to breathing cardiac emergencies, including the use of an Automated External Defibrillator (AED) to care for a victim of cardiac arrest.

L S 277 Lifeguarding 1(0,3) Students gain the knowledge and skills to prevent, recognize and respond to emergencies and to provide care for injuries and sudden illness. Upon course completion, students receive a lifeguarding certification from the American Red Cross.

L S 278 Wilderness First Aid 1(0,2) This American Red Cross Wilderness First Aid with Adult CPR course provides individuals involved with wilderness activities with the knowledge and skills to prevent, recognize and provide basic care for injuries and sudden illness when more advanced help is not immediately available.

L S 291 Outdoor Leadership 1(0,3) Introduces the skills necessary to lead others in a backcountry environment. Focus is on wilderness travel skills, minimum impact, group dynamics, leadership skills and decision making. Course also includes certification in Wilderness First Aid.

L S 347 Advanced Alpine Skiing 1(0,3) Advanced downhill snow skiing instruction in such techniques as mogul skiing, check turns, free-style, and racing. There is an additional fee for course. Taught over Christmas break. Credit is awarded for spring semester. (Contact Department of Parks, Recreation and Tourism Management in October.) *Preq:* L S 147 or consent of instructor.

L S 389 Intermediate Tennis 1(0,3) Develops skills necessary to play at a competitive level of tennis. Students learn mechanically sound tennis skills, court positioning, court movement, proper shot selection, and strategic insight into the game. *Preq:* L S 189 or consent of instructor.

LIBRARY

Librarians: L. Bodenheimer, J. G. Comfort, J. E. Cross, P. A. Draper, B. A. W. Helsel, M. F. Kohl, P. G. Munson, L. P. Sill, D. S. Taylor, P. J. Tyler, K. L. Wall, *Dean*; *Associate Librarians:* A. C. Burns, G. M. Cochrane, C. A. Colthorpe, C. C. Cooper, E. J. Holley, *Chair*; S. D. Johnson, D. G. Julian, S. R. Schilf, K. M. Wesley; *Assistant Librarians:* S. M. Dutkiewicz, J. R. Friedman, M. S. Futral, S. George-Williams, R. L. Hollandsworth, S. J. Robichaud, E. J. Rock, G. Teague, R. D. Wilmott

LIB 100 Clemson Connect 0 Introduction to the learning environment at Clemson University. Includes instruction in information technology and information skills. To be taken Pass/Fail only.

LIB 199 Creative Inquiry—The Libraries 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

LIB 299 Creative Inquiry—The Libraries 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

LIB 399 Creative Inquiry—The Libraries 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

LIB 499 Creative Inquiry—The Libraries 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

MANAGEMENT

Professors: N. Balakrishnan; R. S. Cantrell, W. B. Gartner, D. W. Grigsby, V. Grover, R. L. LaForge, T. L. Leap, M. A. McKnew, A. V. Roth, P. L. Roth, V. Sridharan, *Chair; Associate Professors:* L. D. Fredendall, R. Klein, J. Miller, R. L. Purvis, T. L. Robbins, W. H. Stewart Jr., J. B. Thatcher; *Assistant Professors:* S. C. Ellis, P. T. Gianiodis, K. M. Green, R. M. Henry, G. Ozkan, R. Raman, K. D. Scott, T. J. Zagenczyk; *Lecturers:* K. D. Clark, M. Cole, A. Ellis, S. E. Yoder

MGT 201, H201 Principles of Management 3(3,0) Management's role as a factor of economic production. Functions of management, principles of organization, and behavior in organizations.

MGT 218 Management Personal Computer Applications 3(0,6) Personal computer applications that support managers. Students learn from hands-on work rather than lecture. To be taken Pass/Fail only.

MGT 297, H297 Creative Inquiry—Management 1-3(1-3,0) Students plan, develop, and execute a research project related to the field of management and present their findings. The development of the project includes lectures about research design, conduct, and data analysis. May be repeated for a maximum of six credits.

MGT 305 Economics of Transportation 3(3,0) Topics include history and structure of transportation systems in the United States, the nature of transportation costs and rates, transportation systems as factors in industrial location, transportation policy, and transportation's role in national security. *Preq:* Junior standing.

MGT (ECON) 306 Managerial Economics 3(3,0) See ECON 306.

MGT 307, H307 Human Resource Management 3(3,0) Principles, concepts, and techniques concerned with effective and efficient utilization of personnel. Emphasizes motivation, leadership, and human behavior related to employer-employee relations. Topics include personnel recruitment, classification, selection, training, development, and performance evaluation. *Preq:* MTHSC 309 or equivalent.

MGT 310, H310 Intermediate Business Statistics 3(3,0) Quantitative methods of the management scientist with applications to business and industrial problems. Topics include regression analysis, correlation analysis, analysis of variance, sampling, and nonparametric methods. Credit toward a degree will be given for only one of MGT 310 or EX ST 311. *Preq:* MTHSC 309 or equivalent.

MGT 312, H312 Decision Models for Management 3(3,0) Exploration of ways in which management science decision models can help in making sound managerial decisions. Problem solving is Excel-based. Topics include linear programming, project scheduling, and simulation. *Preq:* MTHSC 309 or equivalent.

MGT (E L E) 315 New Venture Creation II 3(3,0) Second of a two-part series examining entrepreneurship. Using opportunity analysis developed in MKT (E L E) 314, course focuses on designing and managing an organization capable of effectively pursuing the opportunity. Topics include organization strategy and design, start-up capital, operations and sourcing issues, leadership, team building, and management of rapid growth. *Preq:* MKT (E L E) 314.

MGT 317 Logistics Management 3(3,0) Management of physical distribution and supply systems with emphasis on design concepts, cost determinants, and control. *Preq:* Junior standing.

MGT 318 Management of Information Systems 3(3,0) Introduction to information systems concepts and applications in business. Topics include software, hardware, decision support and knowledge based systems, database, information systems design and implementation, and the management of information systems. *Preq:* MGT 201 or consent of instructor.

MGT 390 Operations Management 3(3,0) Examines the role of operations management in both manufacturing and service organizations. Discusses the concepts, tools, and techniques for managing the operations function. Topics include operations strategy, design, planning, and control. *Preq:* MTHSC 309 or equivalent.

MGT 398 Internship in Management 1-3 Faculty-supervised management internship to give students learning opportunities that support their classroom experiences. Requires at least 150 hours of internship work per credit hour received. Course enrollment and internship must occur in the same semester. May be repeated for a maximum of three credits. To be taken Pass/Fail only. *Preq:* Junior standing, 2.0 cumulative grade-point ratio, consent of instructor.

MGT 400 Management of Organizational Behavior 3(3,0) Provides management students with a framework for understanding how behavior within business organizations is managed. Particular emphasis is on integrating management theory with recent developments in the behavioral sciences with distinct management applications. Theory, research, and business applications are considered. *Preq:* MGT 201.

MGT 402, H402 Operations Planning and Control 3(3,0) Managing, planning, and controlling production and service operations emphasizing demand forecasting, aggregate planning, production scheduling, and inventory management. *Preq:* MGT 390 or consent of instructor.

MGT 403 Special Problems 1-3(1-3,0) Students plan, develop, and execute a research project related to the field of management and defense studies. May be repeated for a maximum of six credits. *Preq:* Senior standing in Industrial Management or Management, consent of instructor.

MGT 404 Advanced Statistical Quality Control 3(3,0) Statistical quality control techniques as applied to all areas of quality control: process control, process capability, acceptance sampling, and economic aspects of quality decisions. *Preq:* MGT 390.

MGT 408 Lean Operations 3(3,0) Examines the use of scientific methods for the design of operating systems for both manufacturing and services. Special emphasis is on the development of the Toyota Production System for continuous improvement and the application of the relevant techniques to the design of facilities, jobs, and systems. *Preq:* MGT 390.

MGT 411 Project Management 3(3,0) Examination and application of the project management body of knowledge. This consists of theory, tools, and techniques to organize, plan, and control individuals, teams, quality, and operations while conducting a project. *Preq:* MTHSC 309 or equivalent.

MGT 412 Sourcing and Supplier Management 3(3,0) Provides an understanding of the key issues in selecting and developing suppliers. Provides a conceptual framework to understand purchasing's function within the firm and its role in supply chain management. *Preq:* MGT 390.

MGT 414 Statistical Analysis 3(3,0) Application of statistics in management decision making. Emphasis is on the proper design, analysis, and interpretation of planned experiments. Topics include single factor through fractional factorial experiments. *Preq:* MGT 310 or equivalent.

MGT 415, H415 Business Strategy 3(3,0) Capstone course for seniors. Various methods are used in analyzing complex business problems, requiring students to integrate their knowledge of all areas of business. Student participation and written and oral communications are stressed. *Preq:* FIN 306 or 311; MGT 201; MKT 301; Senior standing.

MGT 416 Management of Human Resources 3(3,0) Recent developments in the management of human resources with emphasis on results of research into the motivation, development of potential, and full utilization of the human resources. *Preq:* MGT 307, 400.

MGT 422 Small Business Management 3(3,0) Study of management of the small independently owned and operated business. Emphasizes analyzing new business opportunities, planning and establishing a growing concern, and managing the contemporary small business. Field experience in consulting with small businesses enhances students' understanding of the unique opportunities and problems of small business organizations. *Preq:* MKT 301 or consent of instructor.

MGT 423 International Business Management 3(3,0) Survey of theoretical and institutional complexities of international business operations. Topics include exporting, importing, foreign investment, multinational corporations, and international payment system. *Preq:* Junior standing.

MGT 424 Global Supply Chain Management 3(3,0) Design, planning, control, and improvement of supply chains for competing effectively in the context of global operations. Topics include supply chain structure and configuration, approaches to intra-organizational and inter-firm integration, and complexities of material, information, and cash flows across international borders. *Preq:* MGT 390 or consent of instructor.

MGT 425 Compensation Management 3(3,0) Examination of compensation employees seek in exchange for their efforts and contributions. Topics include government and union influences; job content analysis, description, and evaluation; developing pay structures; measuring and paying for performance; employee benefits; administration of the compensation plan; executive, managerial, professional, and sales. *Preq:* MGT 307, 400.

MGT 426 Industrial Traffic Management 3(3,0) Surveys the responsibilities and functions of industrial traffic management in manufacturing and distribution. Emphasizes the role of the industrial traffic manager in optimizing the logistics system of the firm (i.e., the materials management of its inbound supplies and the distribution of its finished products). *Preq:* MGT 305 or 317.

MGT 427 Managing Continuous Improvement 3(3,0) Examination of issues related to continuous improvement, including a systematic approach to selecting improvement areas, determining how to improve, plan, and manage the improvement process. Topics include selecting performance measurements, using teams to achieve breakthrough change, identifying root causes of problems, and developing and implementing solutions to problems. *Preq:* MGT 390 or consent of instructor.

MGT 430 Senior Seminar in Management 3(3,0) In-depth study of current business topics; allows senior Management students to relate their academic studies to real-world problems. Senior paper is required. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Senior standing.

MGT 431 Employee Diversity, Rights, and Responsibilities 3(3,0) Focuses on employee and organizational rights and responsibilities. Topics include various types of discrimination (race, sex, religious, national origin, age, and disability status); drug and alcohol testing; AIDS in the workplace; employee discipline and termination issues; privacy and safety concerns; and union organizing campaigns. *Preq:* MGT 307, 400.

MGT 435 Personnel Interviewing 3(3,0) Helps students understand current interviewing theory, conduct an employment interview, and advise their future employers how to improve interviewing programs. Topics include job analysis, legal issues, types of interviews, and evaluating applicants. *Preq:* MGT 307, 400.

MGT 436 White-Collar Crime 3(3,0) White-collar crime and corruption are examined from a managerial perspective. Topics include financial crimes, crimes against consumers, environmental crimes, acts of institutional corruption, the impact of organized crime on legitimate businesses, and computer crime. *Preq:* Senior standing; *Coreq:* FIN 306.

MGT (I E) 444 International Perspectives in Industrial Management 1-6(1-6,0) Provides an international perspective to industrial management via organized plant visits to businesses in a foreign country and lectures by and discussions with senior operations managers. Cultural visits and lectures are also organized to provide a holistic perspective to cover cultural and economic environment of the host country. Students are responsible for travel costs. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

MGT 452 Systems Analysis and Design 3(3,0) Follows the traditional systems development life cycle (SDLC), although alternative methodologies are also discussed. Focuses on earlier phases of the SDLC, from IS planning through specification of structured requirements and on the methods, techniques, and tools used to determine information requirements and their unambiguous documentation. *Preq:* Junior standing.

MGT 454 Systems Implementation 3(3,0) Builds upon skills of programming, database, and systems analysis and design by involving students with the later phases of the systems development life cycle (SDLC). Students design and develop a system using various platforms. Focus is on the logical and physical system design. *Preq:* CP SC 462 or equivalent, MGT 452.

MGT 455 Emerging Information Technology Trends in Business 3(3,0) In-depth study, through case studies, readings, and hands-on experience, of emerging information technologies in and across business organizations. Focuses on understanding, effective deployment, and impact of these technologies on business outcomes. *Preq:* Junior standing.

MGT 456 Business Information Management 3(3,0) In-depth study, through case studies, readings, and hands-on experience, of decision support systems and related knowledge-based technologies. Focus is on organizational decision making and its data, information, and knowledge-based support systems. *Preq:* Junior standing.

MGT 490 Selected Topics in Industrial Management 3(3,0) In-depth examination of advanced topics in Industrial Management. Topics may vary in keeping with developments in the management profession and interests of faculty. Emphasizes the application of these topics to the production and operations management environment. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* MGT 402 or 404 or 408.

MGT 497, H497 Creative Inquiry—Management 1-3(1-3,0) Students plan, develop, execute, and direct a research project related to the field of management and present their findings. The project includes lectures about research design, conduct, and data analysis. May be repeated for a maximum of six credits.

MARKETING

Professors: L. C. Carlson, M. J. Dorsch, C. R. Duke, S. J. Grove, W. E. Kilbourne, G. M. Pickett, Chair; M. A. Raymond; *Associate Professors:* T. L. Baker, R. Gomes, C. D. Hopkins, P. A. Knowles, M. C. LaForge, J. D. Mittelstaedt, J. N. Moore; *Assistant Professors:* S. A. Jones; *Lecturers:* J. G. Gaubert, J. W. Price

MKT 298 Creative Inquiry—Marketing 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits.

MKT 301, H301 Principles of Marketing 3(3,0) Principles and concepts involved in planning, pricing, promoting, and distributing of goods and services. *Preq:* ECON 200 or 211 or 212; sophomore standing.

MKT 302 Consumer Behavior 3(3,0) Examination of selected individual and group behavioral science concepts and their application to the understanding of consumer decision making. *Preq:* MKT 301.

MKT (E L E) 314 New Venture Creation I 3(3,0) First in a two-part series that continues with MGT (E L E) 315 assessing entrepreneurial opportunities. Focuses on creativity, idea generation, market opportunity analysis, strategy, and methods of entry. Opportunity analysis may be developed into a full new venture plan in MGT (E L E) 315. *Preq:* Junior standing.

MKT 321 Sports Marketing 3(3,0) Exploration of the essentials of effective sports marketing. Topics include application of marketing principles in the sports area, licensing issues, sponsorships and endorsements, stadium and arena marketing, broadcasting and media considerations, public policy and sports, and unique marketing challenges for sport specific products (football, basketball, baseball, motorsports, etc.) *Preq:* MKT 301 or consent of instructor.

MKT H390 Junior Honors Research 1(1,0) Students select and complete a research project approved by a faculty advisor, in conjunction with an approved three-credit marketing course (other than MKT 301, H301, or 431). Students are expected to display a command of marketing theory and an ability to apply theory to their research. *Preq:* MKT 301 or H301, membership in Calhoun Honors College, consent of faculty member supervising research.

MKT 398 Creative Inquiry—Marketing 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits.

MKT 399 Marketing Internship 3(0,9) Pre-planned, preapproved, faculty-supervised marketing internships. Credit will only be given for internships of at least ten full-time, consecutive weeks with the same internship provider. Restricted to students with a major in Marketing. To be taken Pass/Fail only. *Preq:* MKT 301 and consent of instructor.

MKT 420 Professional Selling 3(3,0) Current theories about the selling of goods and services to organizational buyers in the context of long-term relationships. Role playing, video-taped presentations, and other techniques are generally employed to enhance interpersonal communication skills. *Preq:* Junior standing, MKT 301.

MKT 423, 623 Promotional Strategy 3(3,0) Emphasizes promotion as the communication function of marketing. Attention is given to communication theory and promotion's relation to mass and interpersonal communication. Factors affecting promotional decision-making process are explored, and promotion as a competitive tool is examined. *Preq:* MKT 301 or consent of instructor.

MKT 424 Sales Management 3(3,0) Comprehensive examination of the planning, implementation, and control of professional sales organizations. *Preq:* MKT 301 and 420 or consent of instructor.

MKT 425 Retail Management 3(3,0) Retailing is studied from a decision-making approach. Topics include target market analysis, location analysis, merchandising, human resources, pricing and promotion. *Preq:* MKT 301 and 420, or consent of instructor.

MKT 426 Business-to-Business Marketing 3(3,0) Study and analysis of the unique aspects of marketing goods and services to organizational buyers rather than household consumers. Emphasis is on developing strategic responses to market opportunities given competitive behavior. *Preq:* MKT 301 or consent of instructor.

MKT 427, 627 International Marketing 3(3,0) Study of marketing from the international point of view. Emphasis is on the necessary modification of marketing thinking and practice for foreign markets due to individual environmental differences. *Preq:* MKT 301.

MKT 428, 628 Services Marketing 3(3,0) Exploration and study of the nature of service organizations and the principles that guide the marketing of their products. Emphasis is on a marketing mix that is fundamentally different than that found in traditional goods marketing. *Preq:* MKT 301 or consent of instructor.

MKT 429, 629 Public and Nonprofit Marketing 3(3,0) Examines the role and application of marketing in public and nonprofit settings. Focuses on a conceptual understanding of the marketing discipline and marketing processes and shows how basic concepts and principles of marketing are applicable to public and nonprofit organizations. *Preq:* MKT 301 or consent of instructor.

MKT 430, 630 Marketing Product Management 3(3,0) Management of the firm's product or service offerings. Topics include new product screening, evaluation, and development; product line and mix analysis, abandonment decisions, brand manager's role, new product development department, and others. Emphasis is on decision making. *Preq:* MGT 310, MKT 301; or consent of instructor.

MKT 431 Marketing Research 3(3,0) Research used in marketing decision making. Emphasizes methods and techniques used in planning, collection, processing, and utilizing information. Topics include research design, sources of information, questionnaire design, sampling, data collection, and data analysis. *Preq:* Marketing major; MGT 310; MKT 301; MTHSC 309 or equivalent.

MKT 433 Sport Marketing Strategy 3(3,0) Provides students with basic knowledge about brand management as it applies to sport. Addresses basic principles and guiding precepts of how sport-based organizations build strong brands. *Preq:* MKT 321 or consent of instructor.

MKT 434 Sport Promotion 3(3,0) Emphasizes the promotional function of sport. Topics include event sponsorship, developing media relationships, endorsements, promotion objective setting and budgeting, media planning and scheduling, and utilizing the tools of promotion within a sport context. Integrated Marketing Communication provides the theoretical and managerial framework for how these factors are utilized optimally. *Preq:* MKT 321, 423.

MKT 443 Advertising Strategy 3(3,0) Advertising strategy emphasizing knowledge of target audiences, along with the messages to communicate effectively with them. Foundations include knowing, motivating, and changing behavior of target audience. Issues include models for decisions, tools for promotion, and integrated advertising plans. *Preq:* MKT 301.

MKT 445 Macromarketing 3(3,0) Examines the relationship between marketing and society, focusing on the social impact of marketing practices. Topics include technology, ethics, materialism, globalization, environmental sustainability, and the political and economic philosophy underlying marketing. Course is multidisciplinary and uses a variety of readings to cover each topic area. *Preq:* MKT 301 and junior standing, or consent of instructor.

MKT 450 Strategic Marketing Management 3(3,0) Application of marketing constructs in analyzing and solving marketing problems. Emphasizes information systems, data analysis, and critical-thinking skills in solving marketing problems in a wide range of managerial decision areas, including, but not limited to, new product development, pricing, advertising, personal selling, channels, and international marketing. *Preq:* Marketing major, MKT 301, six credits of 400-level marketing courses.

MKT H490 Senior Honors Thesis Research 3(3,0) Students, in consultation with a Marketing faculty member, choose a topic for the honors thesis and produce a research proposal that involves an imaginative approach to the subject, a sufficient literature review, a comprehensive introduction to the research topic, and a detailed research plan. *Preq:* MKT H390.

MKT H491 Senior Honors Thesis Writing and Presentation 3(3,0) Students implement their research plans, write up their reports, and present and defend their Senior Honors Theses to an audience of Marketing faculty, Honors students, and invited others. *Preq:* MKT H490.

MKT 495, 695 Selected Topics 3(3,0) In-depth examination of timely topics in marketing. May be repeated for credit, but only if different topics are covered. *Preq:* MKT 301 or consent of instructor.

MKT 498 Creative Inquiry—Marketing 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits.

MKT 499 Independent Study 1-3(1-3,0) Directed readings or independent research in selected marketing areas. Topics must be selected and proposed by student. Proposals must be approved by instructor. May be repeated for a maximum of three credits. *Preq:* MKT 301 and consent of instructor.

MATERIALS SCIENCE AND ENGINEERING

MS&E 101 Materials Technology in Everyday Life 3(3,0) Introduces principles of materials science benefiting citizens. Students learn how to make intelligent choices about everyday materials and devices and present their informed opinions through class discussion and group projects involving controversial topics such as recycling, green manufacturing, and nanotechnology.

MS&E 251 Materials Science and Engineering Portfolio I 1(1,0) Introduces students to the concept of self-paced professional development throughout their plans of study. Each student is assigned a faculty member to act as mentor and advisor. *Preq:* Consent of instructor.

MS&E 324 Statistics for Materials Science and Engineering 3(3,0) Introduction to statistics with particular application to the material industry. Covers measures of central value and variation, probability, the normal curve, tests of hypotheses, elementary correlation, and regression. *Preq:* Sophomore standing or consent of instructor.

MS&E 450 Materials Science and Engineering Portfolio 2(2,0) Students working in groups present and discuss practical, ethical, safety, and business topics in the polymer and textile industries. Students are required to complete their electronic portfolios. To be taken Pass/Fail only.

MS&E 451 Materials Science and Engineering Portfolio II 1(1,0) Student continues self-paced professional development throughout the rest of his/her plan of study by working with the faculty member assigned to act as mentor and advisor. *Preq:* MS&E 251 and consent of instructor.

MS&E 491 Undergraduate Research 1-3(0,2-6) Investigation of a typical materials science and engineering problem under the direct supervision of a faculty member. After completing the research, students prepare a formal written and oral report. *Preq:* Consent of instructor.

MATHEMATICAL SCIENCES

Professors: W. P. Adams, J. R. Brannan, N. J. Calkin, C. L. Cox, V. J. Ervin, X. Gao, R. E. Jamison, P. C. Kiessler, K. B. Kulasekera, R. B. Lund, W. F. Moss III, D. R. Shier, R. L. Taylor, *Chair:* D. D. Warner, M. M. Wiecek; *Associate Professors:* C. M. Gallagher, S. L. Ganter, K. L. James, E. W. Jenkins, T. R. Khan, H. K. Lee, H. Maharaj, G. L. Matthews, C. Park, J. K. Peterson, M. J. Saltzman, C. L. Williams; *Assistant Professors:* D. M. Ambrose, J. Brown, E. S. Dimitrova, B. H. Fralix, J. A. Hoffacker, H. Kerivin, M. Macauley, H. R. MacMillan, M. J. Schmoll, H. Maharaj, J. Medlock, L. Rebholz, S. Sun, X. Sun, F. X. Vera, H. Xue, J. R. Yoon; *Senior Lecturers:* S. S. Biggers, M. E. Cawood, T. A. Johnson, S. A. Prevost, D. M. Simms; *Lecturers:* J. E. Cottingham, R. E. Davidson, C. A. Davis, E. Gallagher, A. A. Guest, M. L. Hanna Jr., L. A. Kinard, M. Z. Krohn, J. M. Lamb, J. I. McKnew, D. A. Moss, J. R. Newton, T. F. Parrott, M. A. Reba, M. Rios-Adams, L. J. Shick, W. B. Staufeneger, A. K. Stoddard, T. C. Teitloff, J. Van Dyken, S. E. Walker; *Visiting Professors:* J. D. Fulton, W. J. Padgett; *Visiting Associate Professor:* D. M. Fairbairn; *Visiting Assistant Professors:* E. H. Breazel, M. Z. Krohn, J. B. Lassiter, B. A. Novick, I. V. Viktorova

MTHSC 101 Essential Mathematics for the Informed Society 3(3,0) Topics include logic and computers, probability and statistics, and financial mathematics. Specific topics include Boolean algebra, digital data formats, randomness, graphical representation of data, inference and estimation; interest, annuities, and amortization. Not open to students who have received credit for MTHSC 301, 302, 309, or EX ST 301. *Preq:* Satisfactory score on the Clemson Mathematics Placement Test or consent of department.

MTHSC 102 Introduction to Mathematical Analysis 3(3,0) Intuitive approach to the concepts and applications of calculus. Topics include functions and graphing, differentiation, and integration. Applications from social, biological, and management sciences are presented. Not open to students who have received credit for MTHSC 106. *Preq:* Satisfactory score on the Clemson Mathematics Placement Test or consent of department.

MTHSC 103 Elementary Functions 3(2,2) Gateway course for MTHSC 106. Comprehensive treatment of functions and analytic geometry with applications including polynomial, rational, algebraic, exponential, logarithmic, and trigonometric functions. Not open to students who have received credit for MTHSC 105. To be taken Pass/Fail only. *Preq:* MTHSC 104 or satisfactory score on the Clemson Mathematics Placement Test.

MTHSC 104 Precalculus and Introductory Differential Calculus 4(4,0) Relevant precalculus and algebra review, limits, continuity and introduction to differential calculus. The combination of MTHSC 104 and MTHSC 107 covers the same calculus material as MTHSC 106. MTHSC 104 alone cannot be substituted for any calculus course. To be taken Pass/Fail only. Not open to students who have received credit for MTHSC 106. *Preq:* MTHSC 103, 105, 199, or satisfactory score on Clemson Mathematics Placement Test or consent of department.

MTHSC 105 Precalculus 5(4,2) Extensive treatment of topics chosen to prepare students for the study of calculus. Special emphasis is given to polynomial, rational, exponential, logarithmic, and trigonometric functions and their graphs, as well as basic and analytic trigonometry. Students who have received credit for any other mathematical sciences course will not be allowed to enroll in or receive credit for MTHSC 105. To be taken Pass/Fail only.

MTHSC 106, H106 Calculus of One Variable I 4(4,0) Topics include analytic geometry, introduction to derivatives, computation and application of derivatives, integrals, exponential and logarithm functions. *Preq:* MTHSC 103 or 105 or satisfactory score on the Clemson Mathematics Placement Test or consent of department.

MTHSC 107 Differential and Integral Calculus 4(4,0) Continuation of MTHSC 104. Successful completion of MTHSC 104 and MTHSC 107 is equivalent to the completion of MTHSC 106. Continuation of differential calculus and an introduction to integral calculus. Not open to students who have received credit for MTHSC 106. *Preq:* MTHSC 104.

MTHSC 108, H108 Calculus of One Variable II 4(4,0) Topics include transcendental functions, applications of integration, integration techniques, indeterminate forms, improper integrals, parametric equations, polar coordinates, and infinite series. *Preq:* MTHSC 106.

MTHSC 109 Co-Calculus II 1(0,2) Recitation style course to accompany MTHSC 108. Reinforces precalculus and calculus topics covered in MTHSC 108 and provides additional instruction and practice. Recommendations are made to students based on their scores on a Calculus Basic Skills Quiz, given at the beginning of each semester. *Preq:* Concurrent enrollment in MTHSC 108.

MTHSC 111 Calculus II for Biologists 4(4,0) Selected topics from integral calculus, eigenvalues and eigenvectors of matrices and differential equations are used to encourage the use of mathematics, computational tool and biological science in the study of relevant biological models. Credit toward a degree will be given for only one of MTHSC 108 and MTHSC 111. *Preq:* MTHSC 106.

MTHSC 115 Contemporary Mathematics for Elementary School Teachers I 3(3,0) Cooperative learning groups, manipulatives, and concrete models are used to demonstrate logical reasoning, problem-solving strategies, sets and their operations, numeration systems, properties and operations of whole numbers, number theory, prime and composite numbers, divisibility, common factors and multiples. Open to Elementary, Early Childhood, and Special Education majors only. *Preq:* MTHSC 104 or satisfactory score on the Clemson Mathematics Placement Test.

MTHSC 116 Contemporary Mathematics for Elementary School Teachers II 3(3,0) Continuation of MTHSC 115. Manipulatives and concrete models are used for properties, operations, and problem solving for integers, elementary fractions, rational numbers, and real numbers. Selected topics in statistics and probability are introduced with a hands-on approach to learning. Restricted to Elementary, Early Childhood, and Special Education majors. *Preq:* MTHSC 115 or consent of instructor.

MTHSC 117 Mathematics for Elementary School Teachers I 3(2,2) Problem-solving strategies, logic, algebraic thinking, sets, relations, functions, numeration systems, whole numbers, integers, number theory, fractions, decimals, applications of percent, real numbers with their computational algorithms and properties are explored. Content, according to state standards, is taught with appropriate methodology for teaching K-6. *Preq:* MTHSC 101.

MTHSC 118 Mathematics for Elementary School Teachers II 3(2,2) Simple probability and descriptive statistics are reviewed. Two- and three-dimensional geometry including polygons, polyhedra and their properties; congruence, similarity, and constructions; coordinate system; standard measurement, area, surface area, volume; and motion geometry are explored. Content, according to State standards, is taught with appropriate methodology for teaching K-6. *Preq:* MTHSC 117.

MTHSC 119 Introduction to Discrete Methods 3(3,0) Topics normally include elementary logic and methods of proof; sets, functions, and relations; graphs and trees; combinatorial circuits and Boolean algebra. *Preq:* Satisfactory score on the Clemson Mathematics Placement Test or consent of department.

MTHSC 129 Problem Solving in Discrete Mathematics 3(2,2) Problem-solving approach to learning mathematics is applied to topics in modern discrete mathematics. Typical selection of topics includes logic and proof, sets, relations, functions, mathematical induction, graphs and trees, counting techniques, recurrence equations. For Bachelor of Science and Bachelor of Arts majors in Mathematical Sciences only. Credit may not be received for both MTHSC 119 and 129. *Preq:* MTHSC 106.

MTHSC 199 Problem Solving in Mathematics 3(2,2) Functions and graphs, mathematical modeling, and applications. Applications from management and life and social sciences are presented. Specific topics include linear, quadratic, polynomial, exponential, and logarithmic functions with emphasis on problem solving. Students who have received credit for any other mathematical sciences course will not be allowed to enroll in or receive credit for MTHSC 199. To be taken Pass/Fail only.

MTHSC 203 Elementary Statistical Inference 3(3,0) Data-based course in statistical methodology: collecting and summarizing data, the normal distribution, one and two sample inference on means and proportions, simple linear regression, analysis of categorical data. May not be taken for credit by students who have passed MTHSC 301, 302, 309, or EX ST 301. *Preq:* Satisfactory score on the Clemson Mathematics Placement Test or MTHSC 101 or consent of department.

MTHSC 206, H206 Calculus of Several Variables 4(4,0) Topics include real valued functions of several variables, multiple integration, differential calculus of functions of several variables, vector field theory. *Preq:* MTHSC 108.

MTHSC 207 Multivariable Calculus 3(3,0) Introduction to the calculus of several variables, differential calculus and optimization of several variables, multiple integrals. Topics from the management sciences are used to illustrate the above concepts. May not be taken by students who have passed MTHSC 206. *Preq:* MTHSC 102, or 106 with consent of instructor.

MTHSC 208, H208 Introduction to Ordinary Differential Equations 4(4,0) Introduction to the study of differential equations and their application to physical problems. Topics include exact, series, and numerical solutions; solutions by means of Laplace transforms; and solutions of systems of differential equations. *Preq:* MTHSC 206.

MTHSC 210 Applied Matrix Algebra 3(3,0) Introduction to the basic principles of matrix algebra with applications to the behavioral and managerial sciences. Major areas of application include linear programming, directed graphs, and game theory. *Preq:* MTHSC 101 and 102 or 106.

MTHSC 216 Geometry for Elementary School Teachers 3(3,0) Informal treatment of the basic concepts of geometry. Open to Elementary, Early Childhood, and Special Education majors only. *Preq:* MTHSC 116 or consent of instructor.

MTHSC 231 Mathematics of Life Insurance 3(3,0) Introduction to basic mathematics of finance and life insurance. Topics include compound interest, annuities certain, mortality tables, life annuities, net premiums, net level reserves, modified reserves, nonforfeiture values, and dividends.

MTHSC 250 Introduction to Mathematical Sciences 1(1,0) Introduction to areas of study, degree options, career choices, and professional development in mathematical sciences. Includes guidelines and requirements for portfolio development and an introduction to ethical issues.

MTHSC 299 Creative Inquiry—Mathematical Sciences 1-3(1-3,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of three credits.

MTHSC 301, H301 Statistical Methods I 3(3,0) Principal topics include collecting and summarizing data, probability distributions, inferences about central values and variation, analysis of categorical data, simple linear regression, basic experimental designs, and the analysis of variance. Credit toward a degree will be given for only one of MTHSC 301, 302, 309, EX ST 301. *Prq:* MTHSC 106 or 207 or 210.

MTHSC 302 Statistics for Science and Engineering 3(3,0) Methodology for collecting, organizing, and interpreting data. Topics include understanding variability, graphical and numerical summarization of data, introductory probability, normal and related distributions, statistical inference, experimental design, simple linear regression. Statistical microcomputer software is used. Credit toward a degree will be given for only one of EX ST 301, MTHSC 301, 302, 309. *Prq:* MTHSC 206.

MTHSC 308 College Geometry 3(3,0) Theorems and concepts more advanced than those of high school geometry. Treatment of the various properties of the triangle, including the notable points, lines, and circles associated with it. *Prq:* MTHSC 106.

MTHSC 309 Introductory Business Statistics 3(3,0) Introductory probability and statistics for business students, particularly those who will take MGT 310. Topics include descriptive statistics, probability, expectations, binomial, normal, sampling distributions, one and two sample estimation and testing. Credit toward a degree will be given for only one of EX ST 301, MTHSC 301, 302, 309. *Prq:* MTHSC 106 or 207 or 210.

MTHSC 311, H311 Linear Algebra 3(3,0) Introduction to the algebra of matrices, vector spaces, polynomials, and linear transformations. *Prq:* MTHSC 108 or consent of instructor.

MTHSC 360 Intermediate Mathematical Computing 3(3,0) Intermediate-level introduction in using computers to solve problems in the mathematical sciences. Fundamental concepts of procedural programming including flow control, modular construction, primitive data structures, recursion, and graphics are applied to problems in applied mathematics, probability, statistics, discrete mathematics, and operations research. *Prq:* MTHSC 108.

MTHSC 365 Numerical Methods for Engineers 3(3,0) Application of undergraduate mathematics and basic engineering principles with emphasis on numerical methods, computer programming and the use of mathematical software packages in the solution of engineering problems. *Prq:* ENGR 141 or concurrent enrollment; MTHSC 208.

MTHSC H382 Honors Seminar 1(1,0) Weekly seminar to prepare students in Departmental Honors Program for independent senior research. At the end of the second semester, each student must have identified a research topic and a faculty advisor. May be repeated for a maximum of two credits. *Prq:* Junior standing in departmental honors program.

MTHSC 399 Creative Inquiry—Mathematical Sciences 1-3(1-3,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of three credits.

MTHSC 400, H400, 600 Theory of Probability 3(3,0) Principal topics include combinatorial theory, probability axioms, random variables, expected values; special discrete and continuous distributions, jointly distributed random variables, correlation, conditional expectation, law of large numbers, central limit theorem. *Prq:* MTHSC 206 or consent of instructor.

MTHSC 403, H403, 603 Introduction to Statistical Theory 3(3,0) Principal topics include sampling distributions, point and interval estimation, maximum likelihood estimators, method of moments, least squares estimators, tests of hypotheses, likelihood ratio methods, regression and correlation analysis, introduction to analysis of variance. *Prq:* MTHSC 400 or equivalent.

MTHSC 405, 605 Statistical Theory and Methods II 3(3,0) Principal topics include simple linear regression, multiple regression and correlation analysis, one-way analysis of variance, multiple comparison, multifactor analysis of variance, experimental design. Computation and interpretation of results are facilitated through use of statistical computer packages. *Prq:* MTHSC 301.

MTHSC 406, 606 Sampling Theory and Methods 3(3,0) Probability-based treatment of sampling methodology. Theory and application of estimation techniques are treated using simple and stratified random sampling, cluster sampling, and systematic sampling. *Prq:* MTHSC 302 and 400, or consent of instructor.

MTHSC 407, 607 Regression and Time-Series Analysis 3(3,0) Theory and application of the regression and time series. Approaches to empirical model building and data analysis are treated. Computation and interpretation of results are facilitated through the use of interactive statistical packages. *Prq:* MTHSC 302, 311, 400; or consent of instructor.

MTHSC 408, 608 Topics in Geometry 3(3,0) Introduction to topics in special geometries which include non-Euclidean space concepts such as projective geometry, finite geometries, and intuitive elementary topology. Brief introduction to vector geometry. *Prq:* MTHSC 206.

MTHSC 410 Number Theory 3(3,0) Introduction to theory of integers and related number systems. Topics include historical development, principle of mathematical induction, divisibility, primes, congruences, number-theoretic functions, primitive roots, quadratic residues, and diophantine equations. *Prq:* MTHSC 108 or consent of instructor.

MTHSC 412, H412, 612 Introduction to Modern Algebra 3(3,0) Introduction to the concepts of algebra. Topics include the number system and the elementary theory of groups, rings, and fields. *Prq:* MTHSC 311.

MTHSC 419, H419, 619 Discrete Mathematical Structures I 3(3,0) Applies theoretical concepts of sets, functions, binary relations, graphs, Boolean algebras, propositional logic, semigroups, groups, homomorphisms, and permutation groups to computer characteristics and design, words over a finite alphabet and concatenation, binary group codes, and other communication or computer problems. *Prq:* MTHSC 311.

MTHSC 430 Actuarial Science Seminar I 1(1,0) Problem-solving seminar to prepare students for the Society of Actuaries' Exam P or the Casualty Actuarial Society's Exam I (Probability). *Prq:* MTHSC 400 or consent of instructor.

MTHSC 431 Theory of Interest 3(3,0) Comprehensive treatment of the theory of interest including from a calculus-based continuous viewpoint. Topics include simple and compound interest and discount, nominal and effective rates, force of interest, basic and general annuities, yield rates, amortization and sinking funds, and applications to bonds, mortgages, and other securities. *Prq:* MTHSC 206.

MTHSC 432 Actuarial Science Seminar II 1(1,0) Problem-solving seminar to prepare students for the Society of Actuaries' Exam FM or the Casualty Actuarial Society's Exam 2 (Financial Mathematics). *Prq:* MTHSC 431.

MTHSC 434, 634 Advanced Engineering Mathematics 3(3,0) Fourier series, Laplace and Fourier transform, and numerical methods for solving initial value and boundary-value problems in partial differential equations are developed. Applications to diffusion wave and Dirichlet problems are given. Matrix methods and special functions are utilized. *Prq:* MTHSC 208.

MTHSC 435, H435, 635 Complex Variables 3(3,0) Elementary functions; differentiation and integration of analytic functions; Taylor and Laurent series; contour integration and residue theory, conformal mapping; Schwartz-Christoffel transformation. *Prq:* MTHSC 206.

MTHSC 440, H440, 640 Linear Programming 3(3,0) Introduction to linear programming covering the simplex algorithm, duality, sensitivity analysis, network models, formulation of models, and the use of simplex codes to solve, interpret, and analyze problems. *Prq:* MTHSC 206, 311, or consent of instructor.

MTHSC 441, H441, 641 Introduction to Stochastic Models 3(3,0) Introductory treatment of stochastic processes, finite-state Markov chains, queueing, dynamic programming, Markov decision processes, reliability, decision analysis, and simulation. Both theory and applications are stressed. *Prq:* MTHSC 400.

MTHSC 450 Introduction to Mathematical Models 3(3,0) Includes a study of the modeling process and examples of existing models chosen from physical, biological, social, and management sciences, depending on the instructor. Written and oral report is required for at least one of the models studied. May be repeated for a maximum of six credits. *Preq:* MTHSC 302, 360, 440, or consent of instructor.

MTHSC 453, H453, 653 Advanced Calculus I 3(3,0) Limits, continuity, and differentiation of functions of one and several variables, the Riemann integral, and vector analysis. *Preq:* MTHSC 206.

MTHSC 454, H454, 654 Advanced Calculus II 3(3,0) Continuation of MTHSC 453. Transformations, multiple integrals, line and surface integrals, infinite sequences and series, and improper integrals. *Preq:* MTHSC 453.

MTHSC 460, 660 Introduction to Numerical Analysis I 3(3,0) Introduction to the problems of numerical analysis emphasizing computational procedures and application. Topics include sources of error and conditioning, matrix methods, systems of linear equations, nonlinear equations, interpolation and approximation by splines, polynomials, and trigonometric functions. *Preq:* MTHSC 206 or 207 and 360 or equivalent.

MTHSC 463, H463, 663 Mathematical Analysis I 3(3,0) Basic properties of the real number system, sequences and limits; continuous functions, uniform continuity and convergence. Integration, differentiation, functions of several real variables, implicit function theory. *Preq:* MTHSC 206.

MTHSC 481 Seminar in Mathematics I-3(1-3,0) Attention is focused on mathematical areas in which nonroutine problems can be posed with comparative ease. Emphasis is on independent study and student use of previously acquired mathematical skills. Open to students by invitation only for a maximum of three credits.

MTHSC 482, H482 Undergraduate Research 3(3,0) Independent research conducted under the supervision and guidance of a faculty member. May be repeated for a maximum of six credits.

MTHSC 491 Independent Study 3(3,0) Independent study or internship in mathematical sciences under faculty supervision. A written report and oral poster presentation of the results of the independent study or internship are required. May be repeated for a maximum of six credits. *Preq:* Mathematical Sciences major.

MTHSC 492 Professional Development 1(1,0) Issues in professional development in the Mathematical Sciences. Individual portfolios are evaluated and critiqued for continued career use. To be taken Pass/Fail only.

MTHSC 499 Creative Inquiry—Mathematical Sciences I-3(1-3,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of three credits.

MECHANICAL ENGINEERING

Professors: D. E. Beasley, *Interim Chair*; S. B. Biggers, G. M. Fadel, R. S. Figliola, M. Grujicic, I. Haque, T. R. Kurfess, J. H. Leylek, J. M. Ochterbeck, J. C. Ziegert, D. A. Zumbrennen; *Associate Professors:* S. Hung, N. Jalili, P. F. Joseph, R. S. Miller, J. R. Saylor, J. D. Summers, L. L. Thompson, C. Tong, P. Venhovens, J. R. Wagner; *Assistant Professors:* B. Ayalew, M. Daqaq, Y. Huang, G. Li, L. Ma, M. L. Mears, G. Mocko, M. A. Omar, P. Pisu, R. G. Prucka, R. Qiao, A. Vahidi, X. Xuan; *Senior Lecturer:* J. M. Delhaye; *Lecturer:* N. Coutris

M E 200 Sophomore Seminar 1(1,0) Seminars address the Mechanical Engineering program, the profession, best student practices, and career paths. Invited presenters and faculty provide lectures and demonstrations. *Preq:* M E 201 (or concurrent enrollment).

M E 201 Statics and Dynamics for Mechanical Engineers 5(3,4) Vector analysis of the effects of forces, couples, and force-systems on rigid bodies. Conditions of static equilibrium for simple structures, including pulleys, trusses, beams, frames. Kinematics and kinetics of general rigid body motion in 2-D. Applications of Newton's laws, energy methods, and impulse momentum methods to simple machine elements. *Preq:* MTHSC 106, 108, PHYS 122. *Coreq:* E G 208, ENGR 141, PHYS 124, MTHSC 206.

M E 202 Foundations of Mechanical Systems 3(3,0) Introduction to basic physical elements of mechanical engineering systems. Problem solving, design, and resourceful application of mathematics and general principles from students' science courses are emphasized throughout. *Preq:* M E 201 and 222 (or concurrent enrollment).

M E 203 Foundations of Thermal and Fluid Systems 3(3,0) Introduction to control volumes, conservation laws of mass, momentum, and energy. Concepts of work and heat are introduced, including rate forms. Properties of pure substances. *Preq:* MTHSC 206, PHYS 221. *Coreq:* M E 222.

M E 222 Mechanical Engineering Laboratory I 2(0,6) Discovery of mechanical engineering principles and phenomena. Introduction to laboratory safety practices, instrumentation, calibration techniques, data analysis, and report writing. Introduction to basic manufacturing processes. *Preq:* PHYS 122 and 124.

M E H300 Junior Honors Seminar 0 Acquaints students enrolled in Departmental Honors Program with current research activities in the Department of Mechanical Engineering. Faculty provide seminars in which research interests are summarized. These seminars are planned to prepare students in choosing a research topic for the senior thesis. *Preq:* Junior standing in departmental honors program.

M E 302, H302 Mechanics of Materials 3(3,0) Relationships between external loads on solid bodies or members and the resulting internal effects and dimension changes, including the derivation of rational formulas for stresses and deformations and the identification and use of important mechanical properties of engineering materials. *Preq:* C M E 210, M E 201, MTHSC 206. *Coreq:* MTHSC 208.

M E 303 Thermodynamics 3(3,0) Study of the second law and entropy. Includes applications to fixed mass systems and control volumes; vapor and gas power cycles; mixtures of gases; vapor psychrometrics; combustion and the third law. Thermochemical equilibrium. *Preq:* M E 203.

M E 304 Heat Transfer 3(3,0) Study of steady and transient heat conduction, free and forced convection, radiation, and multi-mode heat transfer. Emphasizes analytical and numerical solutions to engineering heat transfer problems with a design orientation. *Preq:* M E 308, MTHSC 208, 360.

M E 305 Modeling and Analysis of Dynamic Systems 3(3,0) Presents techniques for developing and analyzing models of mechanical, electrical, electromechanical, fluid and thermal systems. Transient, steady-state and frequency response are determined using analytical and numerical methods. Covers tools for stability analysis and state-space representation. Covers linear free- and forced-vibrations in single- and multi-degree-of-freedom systems with lumped-parameters representation, methods of vibration absorption and isolations. *Preq:* E C E 307, MTHSC 208, 360. *Coreq:* M E 202.

M E 306 Fundamentals of Machine Design 3(3,0) Introduction to failure theory, fatigue analysis, and energy methods for deflection analysis. Integration of these topics with selected portions of mechanics of materials and application of them to the design and analysis of machine elements. *Preq:* M E 202, 302.

M E 308, H308 Fluid Mechanics 3(3,0) Behavior of fluids at rest or in motion, including the study of fluid properties. Emphasizes a rational, analytical approach from which are developed basic principles of broad applicability to all fields of engineering. *Preq:* M E 201, 203, MTHSC 208 (or concurrent enrollment).

M E 310 Thermodynamics and Heat Transfer 3(3,0) Introduction to thermodynamics and heat transfer for nonmajors: properties of liquids and gases, first and second law analysis, introduction to cycles for power and refrigeration, heat flow by conduction and radiation, and convective heat flow and heat exchangers. *Preq:* Junior standing in an engineering curriculum.

M E 312 Manufacturing Processes and Their Application 3(3,0) Fundamental principles associated with production processes and their application to the manufacture of products from metals, polymers, ceramics, and composites. Emphasizes the physical and quantitative aspects of processing, the selection of processes to create products, and the identification processes used to manufacture existing products. *Preq:* M E 304 (or concurrent enrollment), 306 (or concurrent enrollment), 333 (or concurrent enrollment).

M E 333 Mechanical Engineering Laboratory II 2(0,6) Mechanical engineering principles and phenomena are reinforced through student conducted experiments. Presentation of fundamentals of instrumentation, calibration techniques, data analysis, and report writing in the context of laboratory experiments. *Preq:* MTHSC 208, M E 203, 222.

M E 400 Senior Seminar 1(1,0) Seminars address the problems encountered by engineering graduates in professional practice. Invited lecturers as well as faculty provide the lectures and demonstrations. *Preq:* All required 300-level M E courses.

M E 401 Mechanical Engineering Design 3(3,0) Project-oriented course in mechanical engineering emphasizing the role of analysis, synthesis, and evaluation in design and on written reporting of design solutions. Influence of economics and optimization, concurrent development, integration of design and manufacturing, and system creation are utilized for engineering design decisions. *Preq:* ENGL 314; M E 303, 304, 305, 306, 312 (Concurrent enrollment in one of these courses is permitted with departmental approval.)

M E 402 Internship in Engineering Design 3(1,6) Creative application of general engineering knowledge in solving an open-ended design problem provided by a sponsor typically external to the University. Progress is evaluated by a faculty jury. Students present results to the jury and sponsor through written reports and oral presentations addressing University written/oral competency goals. *Preq:* All required 300-level M E courses, M E 401.

M E 403 Control and Integration of Multidomain Dynamic Systems 3(3,0) Introduction of control theory with sensor, actuator, and dynamic plant integration to develop, model, control, and analyze mathematical models of dynamics systems, including mechanical, electrical, electromechanical, hydraulic and pneumatic systems. Transient dynamics are determined using analytical and numerical methods with feedback control systems. Strong emphasis is placed on system design using computer simulation tools. *Preq:* M E 305.

M E 405 Kinematics and Dynamics of Machinery I 3(3,0) Graphical, analytical, and numerical techniques are used in the dynamic analysis and synthesis of machines. Emphasis is on the application of these analysis techniques to planar linkages. *Preq:* M E 202, 302.

M E 407, 607 Applied Heat Transfer 3(3,0) Application oriented extension of M E 304, considering topics in transient conduction, flow of fluids, energy exchange by radiation, and mass transfer. Applications in heat-exchanger design with emphasis on economics and variation of operating conditions from the design point. *Preq:* M E 304, consent of instructor.

M E 415, H415 Undergraduate Research 1-3 Individual research projects conducted under the direct supervision and guidance of a faculty member. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

M E 416, 616 Control of Mechanical Systems 3(3,0) Physical modeling and feedback principles are presented for control of mechanical systems. Transient response, root locus, and frequency response principles are applied to the control of basic mechanical systems such as electric motors, fluid tanks, or thermal processes. PID control laws are emphasized. *Preq:* M E 305.

M E 417, 617 Mechatronics System Design 3(2,3) Mechatronics integrates control, sensors, actuators, and computers to create a variety of electromechanical products. Includes concepts of design, appropriate dynamic system modeling, analysis, sensors, actuating devices, and real time microprocessor interfacing and control. Laboratory experiments, simulation, and design projects are used to exemplify the course concepts. *Preq:* M E 305 or consent of instructor.

M E 418 Finite Element Analysis in Mechanical Engineering Design 3(2,3) Introduction to the finite element method and solid modeling, finite element modeling and analysis using commercial codes; analysis strategies using finite elements; applications to heat transfer, fluid flow, and structures. *Preq:* M E 302, 304, 308, or consent of instructor.

M E 420, 620 Energy Sources and Their Utilization 3(3,0) Covers availability and use of energy sources such as fossil fuels, solar (direct and indirect), and nuclear; addresses energy density and constraints to use (technical and economic) for each source. *Preq:* M E 303, 304.

M E 421, 621 Introduction to Compressible Flow 3(3,0) Introductory concepts to compressible flow; methods of treating one-dimensional gas dynamics including flow in nozzles and diffusers, normal shocks, moving and oblique shocks, Prandtl-Meyer Flow, Fanno Flow, Rayleigh Flow, and reaction propulsion systems. *Preq:* M E 303, 308.

M E 422, 622 Design of Gas Turbines 3(3,0) Guiding principles in gas turbine cycles are reviewed. Turbine and compressor design procedures and performance prediction for both axial and radial flow machines are presented. Methods of design of rotary heat-exchangers and retrofitting gas turbine for regenerative operation are presented. Design projects are used to illustrate the procedures. *Preq:* M E 308.

M E 423, 623 Introduction to Aerodynamics 3(3,0) Basic theories of aerodynamics are presented for the purpose of accurately predicting the aerodynamic forces and moments which act on a vehicle in flight. *Preq:* M E 308.

M E 426 Nuclear Energy 3(3,0) Engineering methods and science principles are considered for the design of components to nuclear power stations. A systems level understanding is emphasized. Includes nuclear fuel cycle and regulatory considerations. *Preq:* M E 303, 304 or consent of instructor.

M E 429, 629 Thermal Environmental Control 3(3,0) Mechanical vapor compression refrigeration cycles, refrigerants, thermoelectrical cooling systems, cryogenics, thermodynamic properties of air, psychometric charts, heating and cooling coils, solar radiation, heating and cooling loads, insulation systems. *Preq:* M E 303, 308.

M E 430, 630 Mechanics of Composite Materials 3(3,0) Develops fundamental relationships for predicting the mechanical and thermal response of multi-layered materials and structures. Develops micromechanical and macromechanical relationships for laminated materials emphasizing continuous filament composites. Discusses the unique nature of composites and the advantages of designing with composites. *Preq:* M E 302.

M E 431 Applied Fluids Engineering 3(3,0) Applications-oriented course in industrial fluids engineering, primarily directed toward the analysis and design of piping systems and components for liquid and gas flow. Topics include friction factors, head loss, flow capacities, piping networks, flow measurement, pumps, control valves, and hydraulic and pneumatic components. *Preq:* M E 308, 333.

M E 432, 632 Advanced Strength of Materials 3(3,0) Topics in strength of materials not covered in M E 302. Three-dimensional stress and strain transformations, theories of failure, shear center, unsymmetrical bending, curved beams, and energy methods. Other topics such as stress concentrations and fatigue concepts are treated as time permits. *Preq:* M E 302.

M E 440 Materials for Aggressive Environments 3(3,0) Emphasizes the engineering aspects of selecting materials for applications in aggressive environments. Various types of materials degradation are discussed as are methods for wastage prevention, including especially engineering design and materials selection approaches. Structural metallic alloys are emphasized; however, technically important ceramics and polymers are also discussed. *Preq:* M E 306.

M E 444 Mechanical Engineering Laboratory III 2(0,6) Continuation of M E 333. Mechanical engineering principles and phenomena are reinforced through student-conducted experiments. Presentation of fundamentals of instrumentation, calibration techniques, data analysis, and report writing in the context of laboratory experiments. *Preq:* M E 306 (or concurrent enrollment), 333, MTHSC 302 or EX ST 411.

M E 453, 653 Dynamic Performance of Vehicles 3(3,0) Introduces techniques for analyzing the dynamic behavior of vehicles. Types of vehicles to be considered are chosen from aircraft, surface ships, automobiles and trucks, railway vehicles, and magnetically levitated vehicles. *Preq:* M E 305, or consent of instructor.

M E 454, 654 Design of Machine Elements 3(3,0) Design of common machine elements including clutches, brakes, bearings, springs, and gears. Optimization techniques and numerical methods are employed as appropriate. *Preq:* M E 306 or consent of instructor.

M E 455, 655 Design for Manufacturing 3(3,0) Concepts of product and process design for automated manufacturing are considered. Topics include product design for automated manufacturing, inspection and assembly, using automation, industrial robots, knowledge-based systems and concepts of flexible product manufacture. *Preq:* M E 306, 312 (or concurrent enrollment), or consent of instructor.

M E (E C E) 456, 656 Fundamentals of Robotics 3(3,0) Introduction to the fundamental mechanics and control of robots, including their application to advanced automation. Topics include robot geometry, kinematics, dynamics, and control. Planar machine structures are emphasized, including methods using computer analysis. Application considerations include the design and operation of robot systems for manufacturing and telerobotics. *Preq:* M E 305, 416 (or concurrent enrollment), or consent of instructor.

M E 471, 671 Computer-Aided Engineering Analysis and Design 3(2,3) Students are exposed to geometric and solid modeling, finite elements, optimization, and rapid-prototyping. Students design an artifact, represent it on the computer, analyze it using FEA, then optimize before prototyping it. Emphasizes the use of computer-based tools for engineering design. *Preq:* ENGR 141, M E 202, or consent of instructor.

M E 493, 693 Selected Topics in Mechanical Engineering 1-6(1-6,0) Study of topics not found in other courses. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of instructor.

MICROBIOLOGY

Professors: W. Y. Chen, T. A. Hughes, C. D. Rice, S. W. Scott; *Associate Professor:* J. M. Henson; *Assistant Professors:* M. Cao, X. Jiang, H. D. Kurtz, T. L. McNealy, K. S. Paul, T. R. Tzeng; *Lecturers:* J. G. Abercrombie, P. A. Mickelsen, K. B. Rudolph

MICRO 101 Microbes and Human Affairs 1(1,0) Introduces Microbiology majors to University career and library services, evaluation of computer program proficiency, Web page development, Microbiology emphasis areas, and Microbiology faculty. Students initiate their own Web-based student portfolios, which showcase their skills and experiences (e.g., résumés, accomplishments, and work samples) during their undergraduate programs. *Coreq:* BIOL 103/105 or 110 or consent of course coordinator.

MICRO 205 Introductory Microbiology 4(3,3) Basic concepts of microbiology, introduced through classroom and laboratory experiences. Emphasizes practical applications in various areas of importance to man. Recommended for students not majoring in a biological science. Not open to Microbiology majors. *Preq:* CH 101, 102, BIOL 103/105.

MICRO 305 General Microbiology 4(3,3) Morphology, physiology, classification, distribution, and cultivation of microorganisms. *Preq:* Introductory biology, CH 101, 102.

MICRO 394, H394 Selected Topics in Creative Inquiry I 2-3(1,3-6) Disciplinary and multidisciplinary group research projects with the goal of developing the students' ability to discover, analyze, and evaluate data. Students are required to document their research activities in their portfolios. May be repeated for a maximum of six credits. Honors students must take at least six credits over a two-semester period with the same research advisor and write an honors thesis. These credits may include MICRO 394, MICRO 494 or both. *Preq:* Consent of instructor.

MICRO 400, H400, 600 Public Health Microbiology 3(3,0) Epidemiology of transmissible diseases including pathogenic characteristics of the infectious organism, modes of transmission, mechanism of infection, diagnostic aids, effective treatments, immunizing procedures, and methods of preventing infection. *Preq:* MICRO 305.

MICRO 401, H401, 601 Microbial Diversity and Ecology 4(2,6) In-depth survey of microbial morphology, ecology, and diversity. Study of the interaction and adaptation of microbes in a wide range of environmental conditions, including consideration of their metabolism, nutrition, growth and the use of microbiological assays. *Preq:* CH 201 or 223, 227, MICRO 305.

MICRO 402, 602 Environmental Microbiology 3(3,0) Discussion of microorganisms in air, terrestrial, and aquatic environments and how they are used for environmental restoration activities. Topics include the nature of biofilms, interactions of microbes with inorganic and organic constituents, processes to implement bioremediation in surface/subsurface environments, and treatment of solid, liquid, and gaseous waste streams. *Preq:* MICRO 305, 401, one semester of organic chemistry, or consent of instructor.

MICRO 403, 603 Marine Microbiology 3(2,3) Discussion of the microbes that inhabit the marine environment, their peculiar physiological traits, and contributions to the ecology of oceans. *Preq:* MICRO 305, organic chemistry.

MICRO 407, H407, 607 Food and Dairy Microbiology 4(3,3) Physical-chemical factors limiting survival and growth of microorganisms during processing and manufacturing of food and dairy products. Standard methods for enumerating and identifying indicator bacteria, yeasts, molds, and microbes producing food and food-borne illness. Starter cultures, fungal toxins, microbial cell injury and standards for food and dairy products. *Preq:* BIOCH 305 or CH 201 or 223, MICRO 305.

MICRO 410, H410, 610 Soil Microbiology 3(2,3) Role of microorganisms in the decomposition of organic substances, transformation of nitrogen and mineral substances in the soil; interrelationships between higher plants and microorganisms; importance of microorganisms in soil fertility. *Preq:* MICRO 305.

MICRO 411, H411, 611 Pathogenic Bacteriology 4(3,3) Study of pathogenic bacteria and their virulence mechanisms. Emphasizes host-microbe interactions, responses to infection and treatment, and research strategies for various topics of bacterial pathogenesis. *Preq:* MICRO 305, 414.

MICRO 412, H412, 612 Bacterial Physiology 4(3,3) Consideration of the cytology, physiology, metabolism, and genetics of bacteria. Includes studies of growth and death, reproduction and mutation, nutrition and metabolic pathways, regulatory mechanisms, and effects of environment. *Preq:* CH 224, MICRO 305, one semester of biochemistry, or consent of instructor.

MICRO 413, H413, 613 Industrial Microbiology 3(2,3) Microbial aspects of large-scale processes for the production of foods, antibiotics, enzymes, fine chemicals, and beverages. Topics include strain selection, culture maintenance, biosynthetic pathways, continuous cultivation and production of single cell protein. *Preq:* MICRO 305.

MICRO (AVS, BIOSC) 414, H414, 614 Basic Immunology 4(3,3) Consideration of the nature, production, and function of basic immune responses in animals. Procedures and mechanisms of antigen-antibody and other immune reactions. *Preq:* MICRO 305, organic chemistry.

MICRO 415, H415, 615 Microbial Genetics 4(3,3) Investigates the molecular basis of microbial lives. Topics include essential genes involved in DNA, RNA and protein metabolism; mutations and genome evolution; global gene regulation; and genetic analysis, using both forward and reverse genetics. *Preq:* BIOCH 301, MICRO 305 and 412.

MICRO 416, H416, 616 Introductory Virology 3(3,0) Introduction to the field of virology, including animal, bacterial, and plant viruses. Topics include nomenclature and classification, biochemical and biophysical characteristics, mechanisms of replication, chemotherapy, and techniques for isolation, assay, and purification. *Preq:* BIOCH 301, MICRO 305, or consent of instructor.

MICRO 417, H417, 617 Molecular Mechanisms of Carcinogenesis and Aging 4(3,3) Discusses alterations that occur at molecular, cellular and tissue levels during cell transformation and aging. Topics include the cell division cycle, signal transduction pathways, oncogenes and tumor suppressors, cell death and cell aging. *Preq:* BIOCH 301 or 305, MICRO 305, and BIOSC 461, or consent of instructor.

MICRO (BIOSC, GEN) 418, 618 Biotechnology I: Nucleic Acids Techniques 4(2,4) See GEN 418.

MICRO 419, 619 Selected Topics in Molecular Medicine 3(3,0) Introduction to various areas of molecular medicine. Examines the latest research and developments in molecular medicine. Designed for students interested in medicine and biomedical research. Graduate students may repeat for a maximum of six credits. *Preq:* BIOCH 301, MICRO 305, or consent of instructor.

MICRO (BIOSC) 456, H456, 656 Medical and Veterinary Parasitology 3(3,0) See BIOSC 456.

MICRO (BIOSC) 457, H457, 657 Medical and Veterinary Parasitology Laboratory 2(1,2) See BIOSC 457.

MICRO 491, H491 Undergraduate Research in Microbiology 1-4(0,3-12) Individually mentored research problems in various areas of microbiology that introduce undergraduate students to the planning and execution of research experimentation and the presentation of research findings. May be repeated for a maximum of eight credits with consent of instructor. Honors students must take at least six hours under a single research advisor over two semesters. Honors thesis is required. *Preq:* Consent of instructor.

MICRO 492 Internship in Microbiology 1-4(0,3-12) Preplanned internship at an advisor-approved facility to give students learning opportunities beyond their classroom experiences. Students submit a Student Internship Contract and a two-page study plan before the internship and a comprehensive report within one week of the end of the internship. May be repeated for a maximum of six credits. To be taken Pass/Fail only. *Preq:* Consent of advisor.

MICRO 493 Senior Seminar 2(2,0) Capstone course engaging students in analysis and discussion of publications from the technical and non-technical literature in biological sciences and from current topics of biology appearing in other media. Students complete their undergraduate on-line digital portfolios. Emphasis is placed on ethical issues that arise as a result of biological research. *Preq:* Senior standing; COMM 150 or ENGL 314; or consent of instructor.

MICRO (BIOSC) 494, H494 Selected Topics in Creative Inquiry II 2-3(1,3-6) See BIOSC 494.

MICRO 495 Service Learning in Biology 2-4(1-2,3-9) Combines service and academic learning while helping pre-college or college students learn about the fundamental aspects of science. Provides lecture and laboratory experiences as students learn to prepare and participate in supervised laboratory teaching for pre-college or college students. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

MILITARY LEADERSHIP

Professor: D. M. Bedard, *Chair;* *Assistant Professors:* M. T. Lee, I. J. McKenna, T. S. Meares, S. K. Noel, T. P. Ormand, C. Tackett, C. A. Wells; *Instructors:* R. C. Hundley, J. H. Warlick, E. D. Worstell

M L 101 Leadership Fundamentals I 2(2,1) Study of leadership focused at the individual level. Students learn effective communicating skills, ethical decision making, small group management, and mental and physical conditioning. Skills are applied in a variety of challenging training events during laboratory, including rappelling, water survival, land navigation, and team athletics.

M L 102 Leadership Fundamentals II 2(2,1) Continued study of leadership focused at the individual and team levels. Topics include problem solving, critical thinking, leadership styles, and group cohesion. Leadership laboratory training includes small tactics and weapons firing.

M L 103 Becoming a Leader 3(3,0) Study of basic leadership, covering leadership theory and skills, organizational systems to support leaders, problem solving, values and ethics, and communication skills. Includes lecture, practical exercises, and guest speakers.

M L 201 Leadership Development I 2(2,1) Study of leadership focused at the team level. Students develop leadership skills through public speaking, managing small groups, and mentoring first-year students. Skills are applied in a variety of challenging training events during leadership laboratory, including rappelling, water survival, land navigation, and team-building exercises.

M L 202 Leadership Development II 2(2,1) Continued study of leadership at the team and small group levels. Focuses on moral leadership, officership, and the Army as a profession. Leadership laboratory training includes small unit tactics, airmobile operations, and weapons firing. Students lead teams throughout the semester.

M L 210 Leaders' Training Course 4(2,6) Five-week leadership camp conducted on an Army post. Students' pay and expenses are provided by the U.S. Army. Environment is rigorous and focused on leadership development. No military obligation is incurred. Completion of this course qualifies students for entry into the Army ROTC Advanced Course.

M L 211 Cadet Field Leadership Training 1-6 Eight-week program of instruction conducted by the U.S. Military Academy to develop leadership skills of sophomore students. Seven weeks of the course are held at West Point with one week at Fort Knox, KY, for Mounted Maneuver Training. To be taken Pass/Fail only. *Preq:* M L 202.

M L 301 Advanced Leadership I 3(2,2) Study of leadership focused on decision making, planning, communicating, and executing. Addresses motivational techniques, the role of a leader, and performance assessment. Provides students with leadership management tools and methodology. Students are responsible for training, developing, and mentoring Basic Course students. Students apply learned techniques in leadership laboratory. *Preq:* M L 202 or 210.

M L 302 Advanced Leadership II 3(2,2) Continuation of leadership study focusing on collective skills training, tactics, and small group instruction. Synthesizes various components of training, leadership, and team-building learned during the Basic Course and M L 301. Final step in students' progression prior to the Leader's Development and Assessment Course. *Preq:* M L 301.

M L 401 Organizational Leadership I 3(2,2) Culmination of leadership study in preparation for commissioning as Army officers. Students continue exercising leadership and management skills as senior cadet leaders. Leadership instruction focuses on coordinating activities with staffs, communicating effectively, counseling and mentoring subordinates, training management and ethics. *Preq:* M L 302, Leader's Development and Assessment Course.

M L 402 Organizational Leadership II 3(2,2) Continuation of M L 401. Focuses on the continued study of moral, ethical, and legal issues faced by leaders. Includes instruction in administrative and logistical management. Requires students to apply their knowledge individually and collectively to solve problems and improve the organization. *Preq:* M L 401.

M L 451 Organizational Leadership III 3(2,3) Transitional leadership development and training for completion cadets and others designed to enhance practical experiences in managing organizational training programs, develop leadership skills by serving in cadet staff positions, develop small group decision making and conflict management skills, and reinforce physical fitness and lifestyle skills required of leaders. May be repeated for a maximum of six credits. *Preq:* M L 302.

MUSIC

Professors: R. E. Goodstein, *Chair;* L. U. Harder, D. R. Rash; *Associate Professors:* P. L. Buyer, L. Dzuris, N. M. Hosler, A. R. Levin, L. L. Li-Bleuel, M. Spede; *Assistant Professors:* H. Altstadt, B. A. Whisler; *Lecturers:* M. T. Anderson, H. D. Bannister Jr., J. Bleuel, I. Bracchitta, D. Conley, M. S. Craig, L. F. Kibler, L. Odom, C. Goodloe, B. Leonard, K. W. Moore, L. Parsons, D. E. Stevenson, L. T. Warlick, R. T. Willey, R. Williamson

MUSIC 101 Beginning Class Piano I 1(0,2) Thorough introduction to basic keyboard skills including solo and ensemble repertoire, technique, applied keyboard theory, and performance. Applied music fee is assessed. *Preq:* Consent of instructor.

MUSIC 102 Beginning Class Piano II 1(0,2) Continued work on keyboard skills, applied keyboard theory, solo and ensemble repertoire, and performance. Applied music fee is assessed. *Preq:* MUSIC 101 or consent of instructor.

MUSIC 105 Music Fundamentals 3(3,0) Covers the rudiments of music theory and aural skills. Includes notation, scales, key signatures, intervals, and chord construction, as well as sight singing and ear training.

MUSIC 111 Beginning Class Guitar I 1(0,2) Introduction to basic guitar skills, including finger-style technique, strumming, and song accompaniment. Students develop skills and appreciation of the discipline through teacher-led drills, ensemble playing, and the exploration of guitar history, style, and the impact of various players and composers on the medium. Applied music fee is assessed. *Preq:* Consent of instructor.

MUSIC 112 Beginning Class Guitar II 1(0,2) Continued work on guitar skills, including finger-style, strumming, pick playing, ensemble playing, and soloing. Also includes music theory for guitarists such as keys, scales, and chord building, as well as discussions of the impact of various players and composers on the medium. Applied music fee is assessed. *Preq:* MUSIC 111 or consent of instructor.

MUSIC 121 Beginning Class Voice 1(0,2) Introduction to basic vocal skills, including breathing, tone production, diction, intonation, and interpretation. Includes solo and ensemble repertoire. In-class group and individual performances are required. Applied music fee is assessed. *Preq:* Consent of instructor.

MUSIC 131 Beginning Instrumental Class 1(0,2) Introduction to basic instrumental skills in a class setting, including proper playing position, tone production, intonation, and ensemble playing. Includes brief history and usage of the given instruments. Different instrumental groups are taught as separate course sections. May be repeated for a maximum of six credits, but only on other instruments. Applied music fee is assessed. *Preq:* Consent of instructor.

MUSIC 151 Applied Music 1(0,1) Individual study in performance medium (piano, voice, strings, woodwinds, brass, percussion, guitar, organ, or carillon). One 30-minute lesson each week, for which a minimum of four hours practice is required. May be repeated for credit with departmental approval of differing performance media. Applied music fee is assessed. *Preq:* Consent of instructor, based upon a qualifying audition.

MUSIC 152 Applied Music 1(0,1) Continuation of MUSIC 151. May be repeated for credit with departmental approval of differing performance media. Applied music fee is assessed. *Preq:* MUSIC 151.

MUSIC 153 Applied Music for Majors 1(0,1) Individual study in vocal or instrumental performance (voice, woodwinds, brass, strings, percussion or keyboards). One 45-minute lesson each week. Jury required. May be repeated for credit with departmental approval of differing performance media. Applied music fee is assessed. *Preq:* Performing Arts major (Music Concentration) and consent of instructor, based upon qualifying audition.

MUSIC 154 Applied Music for Majors 1(0,1) Continuation of MUSIC 153. Jury and performance on a recital are required. May be repeated for credit with departmental approval of differing performance media. Applied music fee is assessed. *Preq:* MUSIC 153, consent of instructor.

MUSIC 180 Introduction to Music Technology 3(2,3) Introduction to music notation, sequencing, digital audio, sound reinforcement, analog and digital recording, and other current music technologies. *Preq:* Performing Arts major or consent of instructor.

MUSIC 185 Introduction to Audio Technology 3(2,2) Introduction to MIDI sequencing, analog and digital recording, digital processing and related audio production technologies. Not open to students who have taken MUSIC 180. *Preq:* Performing Arts major or consent of instructor.

MUSIC 195 Creative Inquiry—Music 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

MUSIC 205 Music Theory I 3(3,0) Beginning analytical techniques in both the classical and popular genres, including aspects of harmony, melody, and rhythm. *Preq:* MUSIC 105, satisfactory score on departmental placement exam, or consent of instructor. *Coreq:* MUSIC 207.

MUSIC 206 Music Theory II 3(3,0) Continuation of MUSIC 205, with added emphasis on modulation and formal structures. *Preq:* MUSIC 205. *Coreq:* MUSIC 208.

MUSIC 207 Aural Skills I 1(0,2) Beginning studies in sight-singing and dictation (melodic, harmonic, and rhythmic). *Coreq:* MUSIC 205.

MUSIC 208 Aural Skills II 1(0,2) Continuation of MUSIC 207 with music of greater complexity and the use of C clefs. *Coreq:* MUSIC 206.

MUSIC 210, H210 Music Appreciation: Music in the Western World 3(3,0) Deepens students' appreciation of their musical heritage through study of the elements of the musical language and its development in Western culture.

MUSIC 251 Applied Music 1(0,1) Continuation of MUSIC 152. Applied music fee is assessed. *Preq:* MUSIC 152, consent of instructor.

MUSIC 252 Applied Music 1(0,1) Continuation of MUSIC 251. May be repeated for credit with departmental approval of differing performance media. Applied music fee is assessed. *Preq:* MUSIC 251, consent of instructor.

MUSIC 253 Applied Music for Majors 1(0,1) Continuation of MUSIC 154. May be repeated for credit on other performance media with departmental approval. Jury is required. Applied music fee is assessed. *Preq:* MUSIC 154, consent of instructor.

MUSIC 254 Applied Music for Majors 1(0,1) Continuation of MUSIC 253. May be repeated on other performance media with departmental approval. Jury and performance on a recital are required. Applied music fee is assessed. *Preq:* MUSIC 253, consent of instructor.

MUSIC 279 Music Practicum 1(0,3) Practical work in music on productions designed for public presentation. Emphasizes sound support, amplification, and mixing. May be repeated for a maximum of four credits. *Preq:* MUSIC 280, 380 or consent of instructor.

MUSIC 280 Sound Reinforcement 3(2,2) Theory and practice of using audio equipment for amplifying sound in venues ranging from conference rooms to concert halls and sports arenas. *Preq:* Performing Arts major or consent of instructor.

MUSIC 285 Acoustics of Music 3(3,0) Study of the relationship between the laws of physics and the production of music from an audio engineering perspective. Topics include mechanical and acoustical laws, harmonic analysis, musical scales, sound production in instruments, and the physiology of hearing. *Preq:* Performing Arts major.

MUSIC 295 Creative Inquiry—Music 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

MUSIC (THEA) 308 Broadway Vocal Tradition I 3(3,0) Introduction to Broadway musical repertoire from the Golden Age of Broadway: 1943–1964. Emphasizes the music with attention to production detail, historical perspective, and social milieu.

MUSIC (THEA) 309 Broadway Vocal Tradition II 3(3,0) Survey of Broadway musical repertoire from new conceptual shows from 1965 to the present day. Emphasizes the music with attention to production detail, historical perspective, and social milieu.

MUSIC 310 Survey of Music History 3(3,0) Comprehensive survey of the Western art music tradition from the Middle Ages to the present. *Preq:* MUSIC 206, Performing Arts major; or consent of instructor.

MUSIC 311 History of American Music 3(3,0) Music in America from 1620 to the present. Indigenous and borrowed influences are examined.

MUSIC 312 History of Jazz 3(3,0) Comprehensive survey of jazz elements and styles. A historical perspective from Dixieland to bebop to jazz/rock is included.

MUSIC 313 History of Rock and Roll 3(3,0) Comprehensive survey of rock elements, styles, and artists. Emphasizes the evolution of rock and roll including a broad examination of musical influences. Course content examines how rock and roll both reflected and influenced social issues.

MUSIC 314 World Music 3(3,0) Introduction to ethnomusicology and music of the world's peoples. Emphasis is placed on music through culture.

MUSIC 317 History of Country Music 3(3,0) Chronological study of country music origins, styles, and artists. Emphasizes the evolution of country music from a cultural expression of the South to a commercial art form of worldwide appeal.

MUSIC 318 History of Audio Technology 3(3,0) Surveys the historical development of audio technology and its social impacts and consequences. Technologies include automatic instruments, recording devices, radio, amplification, consumer listening devices, and distribution formats.

MUSIC 321 Principles of Piano Performance I 3(3,0) In-depth study of the principles of piano performance focusing on how to interpret a musical score, develop technical skills and practice techniques, and use the body correctly at the keyboard. *Preq:* By audition.

MUSIC 323 Piano Accompanying I 1(0,3)¹ Group study in piano accompanying. Focuses on sight-reading and choral, vocal, and instrumental accompanying. Students take group lessons and accompany choral groups and/or applied music students. *Preq:* Consent of instructor.

MUSIC 325 CU Carillonneurs 1(0,2)¹ Group study in playing the 47-bell University carillon. One two-hour meeting each week for which a minimum of two hours of individual practice is required. Participation in a recital is required. *Preq:* Musical keyboard experience, consent of instructor.

MUSIC 330 Small Ensemble 1(0,3)¹ Ensembles: devoted to the musical training of instrumental, vocal ensemble members through reading and rehearsal of appropriate music. Public performances are given periodically in addition to the minimum rehearsal time. Enrollment in simultaneous sections is allowed. *Preq:* Consent of director.

MUSIC 331 Pep Band 1(0,3)¹ Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music. Public performances are given in addition to the minimum rehearsal time. Simultaneous enrollment in multiple sections is allowed. *Preq:* Consent of director.

MUSIC 332 Woodwind Quintet 1(0,3)¹ Ensembles: advanced study of woodwind chamber music media. One one-hour class meeting each week, for which a minimum of two hours of ensemble practice is required. *Preq:* By audition only; concurrent enrollment in MUSIC 362.

MUSIC 333 String Quartet 1(0,3)¹ Ensembles: advanced study of string quartet repertoire. Two 90-minute meetings each week for which a minimum of two hours of practice is required. *Preq:* By audition only. *Coreq:* MUSIC 369, Applied Music.

MUSIC 334 Flute Choir 1(0,3)¹ Ensembles: study of flute ensemble literature. One 60-minute meeting each week for which a minimum of two hours of practice is required. *Preq:* By audition only.

- MUSIC 336 Percussion Ensemble 1(0,2)¹** Ensembles: study and performance of percussion ensemble literature. One two-hour class meeting each week, for which a minimum of two hours of individual practice is required. *Coreq:* MUSIC 331, 362, 363, 364, or 369.
- MUSIC 337 Steel Drum Band 1(0,2)¹** Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music. Public performances are given in addition to the minimum rehearsal time. Rehearsals also include discussions of steel band history and performance practice. *Preq:* Consent of director.
- MUSIC 341 Men's Breakout Ensemble 1(0,2)¹** Small ensembles: study of male a cappella/popular music on an advanced level. *Coreq:* MUSIC 370 or 372 or consent of instructor.
- MUSIC 342 Women's Breakout Ensemble 1(0,2)¹** Small ensembles: study of women's a cappella/popular vocal music on an advanced level. Enrollment is limited with priority given to students who are enrolled in a large choral ensemble. *Coreq:* MUSIC 370 or 371 or consent of instructor.
- MUSIC 343 Men's Small Ensemble 1(0,2)¹** Small ensembles: study of male a cappella/popular, barbershop, and nostalgic music on an advanced level. *Coreq:* MUSIC 370 or 372 or consent of instructor.
- MUSIC 344 Vocal Jazz Ensemble 1(0,3)¹** Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music. Public performances are given periodically in addition to the minimum rehearsal time. *Coreq:* MUSIC 370, 371, 372 or consent of instructor.
- MUSIC 351 Applied Music 1(0,1)** Continuation of MUSIC 252. May be repeated for credit with departmental approval of differing performance media. Applied music fee is assessed. *Preq:* MUSIC 252, consent of instructor.
- MUSIC 352 Applied Music 1(0,1)** Continuation of MUSIC 351. Students are required to perform an appropriate solo in a student recital. May be repeated for credit with departmental approval of differing performance media. Applied music fee is assessed. *Preq:* MUSIC 351, consent of instructor.
- MUSIC 353 Applied Music for Majors 1(0,1)** Continuation of MUSIC 254. May be repeated on other performance media with departmental approval. Jury is required. Applied music fee is assessed. *Preq:* MUSIC 254, consent of instructor.
- MUSIC 354 Applied Music for Majors 1(0,1)** Continuation of MUSIC 353. May be repeated on other performance media with departmental approval. Juried half-recital performance is required. Applied music fee is assessed. *Preq:* MUSIC 353, consent of instructor.
- MUSIC 361 Marching Band 1(0,3)¹** Ensembles: devoted to musical training of ensemble members through reading and rehearsal of appropriate music. Public performances are given periodically in addition to the minimum rehearsal time. Offered fall semester only. *Preq:* Consent of director.
- MUSIC 362 Symphonic Band 1(0,3)¹** Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music. Public performances are given periodically in addition to the minimum rehearsal time. *Preq:* Consent of director.
- MUSIC 363 Jazz Ensemble 1(0,3)¹** Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music. Public performances are given periodically in addition to the minimum rehearsal time. *Preq:* Consent of director.
- MUSIC 364 Concert Band 1(0,2)¹** Devoted to the musical training of ensemble members through reading and rehearsal of appropriate music. Public performances are given periodically in addition to the minimum rehearsal time. *Preq:* Consent of director.
- MUSIC 369 Symphony Orchestra 1(0,3)¹** Mid-sized, college-community orchestra devoted to performing works from standard repertoire. Weekly evening rehearsals with one or more performances per semester. *Preq:* Consent of director.
- MUSIC 370 Clemson University Singers 1(0,3)¹** Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music. Public performances are given periodically in addition to the minimum rehearsal time. *Preq:* Consent of director.
- MUSIC 371 Women's Glee 1(0,3)¹** Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music. Public performances are given in addition to the minimum rehearsal time. *Preq:* Consent of director.
- MUSIC 372 Men's Glee 1(0,3)¹** Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music. Public performances are given in addition to the minimum rehearsal time. *Preq:* Consent of director.
- MUSIC 373 University Chorus 1(0,3)¹** Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music. Public performances are given periodically in addition to the minimum rehearsal time. *Preq:* Consent of director.
- MUSIC 380 Audio Engineering I 3(2,2)** Intermediate-level course in music technology focusing on digital hard-disk recording and acoustical considerations in audio engineering. *Preq:* MUSIC 180 or consent of instructor.
- MUSIC 395 Creative Inquiry—Music 14(14,0)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.
- MUSIC 398 Special Topics in Music 3(3,0)** Consideration of select areas of study in music not addressed by other music courses. May be repeated once for credit. *Preq:* Consent of instructor.
- MUSIC 400, 600 Music in the Elementary Classroom 3(3,0)** Familiarizes teachers in the elementary classroom with traditional, Kodaly, Orff, and Kindermusik approaches in correlating music with language arts, mathematics, and social studies.
- MUSIC 405 Instrumental and Vocal Arranging 3(2,3)** Advanced study of the properties of instruments and voices and their combination in various small and large ensembles. Emphasis is placed on applying this knowledge to the creation of instrumental and vocal arrangements. *Preq:* MUSIC 180, 205, or consent of instructor.
- MUSIC 415 Music History to 1750 3(3,0)** Development of Western music from antiquity to 1750, emphasizing representative literature from various styles and periods. *Preq:* MUSIC 210, 310, or consent of instructor.
- MUSIC 416 Music History Since 1750 3(3,0)** Continuation of MUSIC 415. Music from 1750 to the present. *Preq:* MUSIC 210, 310, or consent of instructor.
- MUSIC 430 Conducting 3(3,0)** Study of choral and instrumental conducting. Emphasis is on manual conducting techniques, attitudes, philosophies, and responsibilities necessary for the preparation, planning, and execution of artistic conducting. *Preq:* MUSIC 205.
- MUSIC 451 Applied Music 1(0,1)** Continuation of MUSIC 352, guiding students in interpretation of advanced solo and ensemble literature. Students are required to perform an appropriate solo in a student recital. May be repeated for credit with departmental approval of differing performance media. Applied music fee is assessed. *Preq:* MUSIC 352 and consent of instructor.
- MUSIC 452 Applied Music 1(0,1)** Continuation of MUSIC 451. Students are required to perform an appropriate solo in a student recital. Applied music fee is assessed. *Preq:* MUSIC 451 and consent of instructor.
- MUSIC 453 Applied Music for Majors 1(0,1)** Continuation of MUSIC 354. May be repeated on other performance media with departmental approval. Jury is required. Applied music fee is assessed. *Preq:* MUSIC 354, consent of instructor.
- MUSIC 454 Applied Music for Majors 1(0,1)** Continuation of MUSIC 453. May be repeated on other performance media with departmental approval. Juried full recital performance is required. Applied music fee is assessed. *Preq:* MUSIC 453, consent of instructor.
- MUSIC 480, 680 Audio Engineering II 3(2,2)** Advanced course in music technology focused on music production integrating digital audio and virtual instruments. *Preq:* MUSIC 380 or consent of instructor.
- MUSIC 485 Production Workshop 3(2,2)** Project-based course focused on music production. Students produce an audio CD that includes recorded audio tracks and/or newly-created sequenced material with creative and appropriate packaging. *Preq:* MUSIC 480.
- MUSIC 495 Creative Inquiry—Music 14(14,0)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

MUSIC 499, 699 Independent Studies 1-3(1-3,0)

Tutorial work for students with special interests in music study outside the scope of existing courses. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.

*This course may be repeated for credit with a maximum of 16 hours of ensemble credit allowable toward a degree.

NONPROFIT LEADERSHIP

NPL 300 Foundations in Nonprofit Leadership 2(2,0) Students develop an understanding of historical and philosophical aspects of nonprofit organizations, as well as special skills needed to develop boards, recruit volunteers, raise funds, and manage day-to-day operations. Career development opportunities are also explored.

NPL 390 Practicum I 1(0,3) Under agency supervision, students spend 60 hours observing and implementing activities, events, and programs in a nonprofit, faith-based, grassroots, or organization approved by instructor. To be taken Pass/Fail only. *Preq:* NPL 300, enrollment in Nonprofit Leadership minor, consent of instructor.

NPL 490 Practicum II 2(0,6) Under agency supervision, students spend 100 hours planning, organizing, and implementing activities, events, and programs in a nonprofit, faith-based, grassroots, or other organization approved by instructor. To be taken Pass/Fail only. *Preq:* NPL 300, enrollment in Nonprofit Leadership minor, consent of instructor.

NURSING

Professors: B. J. Holaday, V. G. Parker, R. H. Pruitt, *Director*; P. A. Smart, D. F. Willoughby; *Associate Professors:* J. B. Craig, J. A. Eggert, L. A. Howe, N. K. Meehan, M. A. Wetsel; *Assistant Professors:* R. Amerson, E. A. Chismark, S. C. Davis, T. K. Fasolino, C. C. Harmon, A. E. Johnson, S. M. Timmons, J. J. Whitcomb; *Lecturers:* L. Arthur-Banning, R. M. Baylor, P. A. Borchway, T. Busby, L. M. Duggan, N. R. Ewing, J. S. Gillespie, J. G. Lanham, C. Murton, A. K. Pye, K. J. Smith, E. O. Swanson, B. G. Warner, S. S. Webster

NURS 140 Computer Applications in Nursing 3(3,0) Introduces students to nursing and the application of computer technology in the delivery of health care. Covers existing computer health-care applications, emerging trends and forecast future needs. Social and ethical issues related to technology are discussed. Nursing majors will be given priority enrollment.

NURS 198 Creative Inquiry—Nursing 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

NURS 298 Creative Inquiry—Nursing 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

NURS 300 Seminar in Health Care Topics 1-4(1-4,0-9)

Individualized in-depth study in a selected health care area; may have a clinical component and/or special projects. Open to non-Nursing majors. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

NURS 303 Medical-Surgical II: Nursing of Adults 7(3,12) Incorporates theoretical and empirical knowledge from physical and social sciences. Uses critical thinking to provide holistic, safe, individualized nursing care to adults, including health promotion, maintenance, restoration, and health teaching. *Preq:* NURS 304, 310, 312, 340. *Preq or Coreq:* NURS 320.

NURS 304 Pathophysiology for Health Care Professionals 3(3,0) Focuses on disease mechanisms and recognition of the manifestations of these mechanisms in body systems. Discussion also includes pharmacologic and mechanical interventions commonly associated with specific disease processes and application to patient-care situations. *Preq:* BIOSC 223 and junior standing in Nursing.

NURS 305 Psychosocial Nursing 3(3,0) Lifespan approach to examine psychosocial, developmental, family, and cultural factors that influence individuals from diverse populations and their families in the promotion, maintenance, and restoration of health. The use of the nursing process, critical thinking, therapeutic communication, and psychosocial nursing interventions is explored. *Preq:* Second semester junior standing in Nursing.

NURS 307 Family Nursing in the Community 4(3,2) Bridge course for registered nurse students that focuses on nursing care of families across the lifespan in the context of the community. Major emphasis is on practice activities to assist individuals in achieving or maintaining wellness in the family, home, and community environments. *Preq:* Admission to RN/BS program.

NURS 310 Health Assessment 3(2,3) Introduces concepts of health, wellness, and illness. Focuses on physical, psychosocial, and cultural assessment for the well adult client with variations across the lifespan. Includes interviewing techniques. *Preq:* Junior standing in Nursing. *Coreq:* NURS 312, 340.

NURS 311 Health Promotion Across the Lifespan 2(2,0) Focuses on health promotion and illness prevention activities across the lifespan for individuals and families in the community. Major emphasis is on nursing's role in the acquisition and maintenance of health as well as the identification and modification of health risk factors. *Preq:* NURS 310, 312, 320. *Preq or Coreq:* NURS 304, 340.

NURS 312 Medical-Surgical I: Therapeutic Nursing Interventions 4(2,6) Focuses on therapeutic nursing interventions, including selected psychomotor skills, communication skills, and teaching/learning. *Preq:* Junior standing in Nursing; *Coreq:* NURS 310; 340.

NURS 313 Health Assessment Through the Lifespan 4(3,2) Expands on RNs' knowledge of health assessment. Focuses on physical and psychosocial assessment for the well client throughout the lifespan. Interviewing techniques are included. *Preq:* Admission to RN/BS program.

NURS 317 Development of the Nursing Profession 3(3,0) Explores the evolution of nursing as a profession, the social and technological factors and challenges, struggles, and accomplishments of past nursing leaders. Includes strategies for effecting change based on experiences of the past.

NURS 318 Multidisciplinary Approach to End-of-Life Care 3(3,0) Integrates principles of care to increase comfort at the end of life, presented within a framework that encompasses the physical, psychosocial, and spiritual dimensions of an individual. Coursework also includes ethical and legal issues related to advance directives, reimbursement, and regulatory topics. *Preq:* PSYCH 201, SOC 201, or consent of instructor.

NURS 319 Health Assessment for RNs 2(2,0) Expands knowledge of health assessment techniques utilized with well or ill adult clients. Emphasizes data collection as a basis for critical thinking in professional nursing practice. *Preq:* Admission to RN/BS program.

NURS 320 Professionalism in Nursing 2(2,0) Application of critical thinking skills in the professional nursing roles in multidisciplinary approaches to health care. Analysis of the historical development of modern nursing. Examination of issues of nursing care to diverse populations within context of ethical and professional standards. *Preq:* All required non-nursing courses and electives or consent of instructor.

NURS 323 Gerontology Nursing 2(2,0) Introduction of theories of aging. Focuses on complex health care issues of aging and chronic care, including promotion, maintenance, and restoration of health of the elderly. Scientific concepts address physiological, psychological, and sociological issues of aging and chronic illness. *Preq:* NURS 310, 312, 320, PSYCH 201, SOC 201. *Preq or Coreq:* NURS 304, 340.

NURS H328 Honors Seminar I 1(1,0) Serves as the foundation for senior honors projects. Students identify a topic of interest, a faculty mentor, and team members for their honors project and begin to review the literature in their areas of interest. To be taken Pass/Fail only. *Preq:* Admission to Nursing Department Honors program.

NURS 330, H330 Research in Nursing 3(3,0) Introduction to conceptual frameworks, models, and theories related to nursing. Analysis of reported research in nursing and related disciplines. Ethical, moral, and legal issues are discussed in relation to nursing research. *Preq:* NURS 310, 312, 320 or admission to RN/BS program.

NURS 333 Health Care Genetics 3(3,0) Focuses on the new genetics and the implications for health care professionals. Discussion includes applications of the evolving genetics technology and services to changing life stages. Issues of ethics relevant to various genetic disorders is also addressed. *Preq:* BIOSC 222.

NURS 334 Integrative Healing: Complementary/Alternative Healthcare 3(3,0) Introduction to healing practices that are complementary with/and alternative (C/A) for conventional Western medicine. Includes exploration of research, principles, techniques, and methods of C/A used in health and healing.

NURS 340 Pharmacotherapeutic Nursing Interventions 3(3,0) Focuses on the integration of nursing process with pharmacotherapeutics, administration, monitoring, and related client education. Includes major drug classifications, indications for use, side effects, interactions, routes of administration, usual dosages and contraindications. *Preq:* Junior standing in Nursing. *Coreq:* NURS 310, 312.

NURS (PHIL) 350 Technology and Philosophy in Nursing 3(3,0) Analyzes influence of increasing application of scientific technology to health care delivery and concomitant ethical issues.

NURS 398 Creative Inquiry—Nursing 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

NURS 401 Mental Health Nursing 5(3,6) Application of theories and the nursing process to identify, implement, and evaluate nursing interventions for the care of clients with psychiatric disorders. *Preq:* All required 300-level nursing courses.

NURS 403 Medical-Surgical III: Complex Nursing of Adults 5(3,6) Focuses on the biological, psychological, philosophical, and sociocultural influences on complex health problems related to acute and traumatic conditions. Emphasizes the concepts of circulation, oxygenation, homeostasis, and compensation in acutely ill adults. *Preq:* NURS 401, 411, 412.

NURS 405 Leadership and Management in Nursing 3(2,2) Focuses on the role of the professional nurse in managing nursing care. Theories and research related to leadership, power, management, organizations, regulation, and ethics are discussed. Directed laboratory experiences are provided. *Preq:* NURS 401, 411, 412, or admission to RN/BS program.

NURS 406 Issues in Professionalism 3(3,0) Analysis of the development of professional nursing. Consideration of educational issues, legal and economic issues, health policy, leadership, cultural variations, and the influence of values in ethical decisions and nursing practice. *Preq:* Admission to RN/BS program.

NURS 408 Senior Nursing Practicum 3(1,4) Considers the impact of selected health issues and problems on the practice of nursing. Presents licensure preparation, maintaining currency in the field, and other relevant topics facing the professional nurse. Under preceptor supervision, students observe, organize, and implement entry level nursing practice. To be taken Pass/Fail only. *Preq:* NURS 401, 411, 412. *Coreq:* NURS 403, 415.

NURS 410 Leadership Management and Nursing Care Practicum 6(3,9) Focuses on the role of the professional nurse in practicing and managing nursing care. Theories and research related to clinical practice, leadership, power, management, organizations, regulation, ethics, and licensure preparation are discussed. Directed lab experiences are provided under preceptor supervision. *Preq:* NURS 403.

NURS 411 Nursing Care of Children 5(3,6) Focuses on child health problems and health maintenance. Emphasizes biological, pathophysiological, psychological, and sociocultural concepts related to nursing care of children with acute, critical, and chronic illnesses. Includes strategies for alleviation of illnesses, restoration of wellness, promotion and maintenance of health, growth, and development. *Preq:* All required 300-level Nursing courses.

NURS 412 Nursing Care of Women and Their Families 5(3,6) Emphasizes biological, psychological, and sociocultural concepts; identification of appropriate nursing strategies to enhance individual capacity to achieve or maintain wellness in the family, home, community, and hospital environment. *Preq:* All required 300-level Nursing courses.

NURS 415 Community Health Nursing 4(2,6) Consideration of health promotion activities for family and community groups with emphasis on community assessment, screening, and health teaching/counseling. Practice activities are related to health promotion in population groups and nursing care of homebound clients. Laboratory settings include homes, schools, industries, and other community organizations. *Preq:* NURS 401, 411, 412, or admission to RN/BS program.

NURS H420 Senior Honors I 2(2,0) Students develop a proposal for a major thesis, directed study project, or research project under the guidance of a faculty preceptor. *Preq:* Senior Honors standing, NURS H330.

NURS 425 Community Nursing 4(3,2) Consideration of health promotion activities for groups within the community with emphasis on community assessment, screening, and health teaching/counseling. Practice activities are related to health promotion in population groups and nursing care of homebound clients. Laboratory settings include homes, schools, industries, public health department, and other community agencies. *Preq:* Admission to RN/BS program.

NURS H428 Senior Honors II 2(2,0) Students implement a proposal for a major directed study project or research thesis under the guidance of a faculty preceptor. *Preq:* Senior Honors standing, NURS H405, H420.

NURS 485 Nurse Extern Practicum 6(0,18) Practicum consisting of preceptor-supervised and faculty-led nursing clinical experiences in a regional health care facility. *Preq:* Completion of at least one adult health and one pathophysiology course or consent of instructor.

NURS 498 Creative Inquiry—Nursing 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

NURS 499 Independent Study 1-4(1-4,0-9) In-depth study in an area of special interest in Nursing. Students develop specific objectives with a faculty member with expertise in the area of interest. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

NUTRITION

See also courses listed under *Animal and Veterinary Sciences, Biochemistry, and Food Science*

Professors A. B. Bodine II, K. L. Cason, T. C. Jenkins, M. E. Kunkel, D. V. Maurice; *Associate Professors* M. D. Condrasky, A. M. Fraser, V. J. Haley-Zulín, *Senior Lecturer* R. M. Hahena

NUTR 203 Principles of Human Nutrition 3(3,0) Study of nutrient functions and requirements, food choices, dietary adequacy, and role of nutrition in physical fitness. Deals with social and scientific issues; health care policy; evaluation and interpretation of nutrition sources from government, private, academic, and the health care sectors. Credit toward a degree will be given for only one of NUTR 203, 205, 451.

NUTR 205 Nutrition for Nursing Professionals 3(3,0) Investigation of targeted general and clinical nutrition topics, including principles of nutrition, life-cycle nutrition, relationship of diet to health and disease, and the role of nursing professionals and nutrition. Credit toward a degree will be given for only one of NUTR 203, 205, 451. *Preq:* Nursing major, BIOSC 222. *Coreq:* BIOSC 223.

NUTR 210 Nutrition and Physical Activity 3(3,0) Topics include role of carbohydrates, fats, and proteins on energy utilization during exercise, altering body composition and improving fitness with diet and physical activity; importance of fluid intake on performance; effectiveness of dietary supplements and ergogenic aids; and choosing a diet appropriate for individual physical activity levels. *Preq:* BIOL 120 and 121, 122, 123, or 124; or equivalent

NUTR 216 Current Issues in Nutrition 1(1,0) Explores current issues in nutrition with emphasis on areas of research and inquiry by faculty.

NUTR 401, H401, 601 Fundamentals of Nutrition 3(3,0) Biochemical and physiological fundamentals of nutrition applicable to man and domestic animals. Considers digestive processes and absorption and metabolism of carbohydrates, lipids, proteins, water, minerals, and vitamins. Discusses energy metabolism and comparative anatomy and physiology of digestive systems. Offered fall semester only. *Preq:* BIOCH 305, CH 223, or consent of instructor

NUTR 418 Professional Development in Dietetics 1(1,0) Provides the steps for dietetic internship application process; career development in the dietetics field; and concepts of professional standards. *Preq:* Senior standing.

NUTR 419 Professional Development in Nutrition 1(1,0) Career development in nutrition and concepts of professional standards and development. *Preq:* Senior standing.

NUTR 420 Selected Topics in Nutrition 1-3(1-3,0) Comprehensive study of special topics in nutrition not covered in detail or contained in other courses. Current developments in each area are stressed. May be repeated for a maximum of three credits, but only if different topics are covered. *Preq:* Senior standing or consent of instructor.

NUTR 421 Special Problems in Nutrition 1-4 (0,3-12) Independent research investigation in nutrition. Special emphasis is on developing a research proposal, conducting the research, and reporting the findings. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Senior standing or consent of instructor.

NUTR 424, 624 Medical Nutrition Therapy I 4(3,3) Principles of nutritional assessment, education, and counseling skills; development of medical nutrition therapy for individuals with obesity and eating disorders, gastrointestinal disorders, metabolic and renal disorders. *Preq:* BIOSC 223, NUTR 451, or consent of instructor.

NUTR 425, H425, 625 Medical Nutrition Therapy II 4(3,3) Development of medical nutrition therapy for individuals with various disease states, including cardiovascular, hepatic, musculoskeletal, and neoplastic disorders. Also considers sociocultural and ethnic aspects of food consumption and alternative nutrition therapies. *Preq:* BIOSC 223, NUTR 424, or consent of instructor.

NUTR 426, 626 Community Nutrition 3(3,0) Study of fundamentals of nutrition care delivery in community programs beginning with assessment and problem identification and continuing through the development, implementation, and evaluation of nutrition intervention programs. *Preq:* NUTR 451 or equivalent or consent of instructor.

NUTR 451, H451, 651 Human Nutrition 3(3,0) Essentials of nutrition and principle nutritional deficiency conditions. Factors affecting adequacy of dietary intake, methods of determining nutritional status, development of nutrition standards, and recent advances in human nutrition. Credit toward a degree will be given for only one of NUTR 203, 205, 451. *Preq:* BIOCH 305/306 or equivalent or consent of instructor.

NUTR 455, 655 Nutrition and Metabolism 3(3,0) Concepts of metabolism fundamental to understanding normal and therapeutic nutrition are examined. Bioenergetics as well as metabolism of carbohydrates, lipids, amino acids, vitamins, and minerals as they relate to nutrition are discussed. *Preq:* NUTR 451 and BIOCH 305 or 423 or 406 or consent of instructor.

PACKAGING SCIENCE

Professors: D. K. Cooksey, R. L. Thomas; *Associate Professors:* D. O. Darby, R. M. Kimmel, Chair; W. S. Whiteside; *Lecturers:* G. S. Batt, H. P. Batt, R. A. Hurley, R. T. Moore; *Adjunct Professors:* A. L. Brody, R. C. Cooksey, H. J. Park; *Adjunct Associate Professors:* L. Bix, M. Daum; *Adjunct Assistant Professor:* R. L. Kaas; *Research Assistant Professor:* Y. T. Kim

PKGSC 101 Packaging Orientation 1(1,0) Overview of the various principles and practices in packaging science, historical development, packaging as a career.

PKGSC 102 Introduction to Packaging Science 2(2,0) Considers functions of a package; materials, processes, and technology used in package development; and the relationship of packaging to the corporation, consumer, and society as a whole. *Preq:* PKGSC 101 or consent of instructor.

PKGSC 103 Packaging Science E-Portfolio 1(1,0) Packaging Science majors initiate professional electronic portfolios that showcase their skills and experiences and lead to career e-portfolios. Students demonstrate proficiency in using important software tools; are introduced to Packaging Science faculty, emphasis areas, and targeted library services; and discuss academic integrity. *Preq:* PKGSC 101. *Coreq:* PKGSC 102 or consent of instructor.

PKGSC 201 Packaging Perishable Products 3(3,0) Covers fundamental characteristics and applications of various materials and systems used to package perishable products such as foods and pharmaceuticals. Discusses packaging issues regarding food, pharmaceutical, and medical packaging. Includes product/package interactions and packaging requirements to address basic theory in food and pharmaceutical protection. *Preq:* CH 201, PKGSC 202, or consent of instructor.

PKGSC 202 Packaging Materials and Manufacturing 4(3,3) Detailed study of packaging materials including glass, metal, metal foils and sheets, wood, paper, paperboard, plastics, composites, adhesives, coatings, cushioning media; their functional properties in packaging application; laminating and combining of different packaging materials. *Preq:* PKGSC 102 or consent of instructor.

PKGSC 203 Packaging Research Fundamentals 2(2,0) Principles, methods, and resources for organizing, researching, and reporting technical work in packaging science. *Preq:* PKGSC 102, 103, ENGL 103, and Packaging Science major; or consent of instructor.

PKGSC 204 Container Systems (Rigid and Flexible) 3(3,0) Examination of all the packages and containers used to develop systems to distribute products. Compatibility of product and package, structural design, costs, and merchandising considerations are stressed. *Preq:* PKGSC 202, 206 (or concurrent enrollment) or consent of instructor.

PKGSC 206 Container Systems Laboratory 1(0,3) Laboratory practice in sample making, designing and constructing various containers. *Preq:* PKGSC 204 (or concurrent enrollment).

PKGSC 220 Package Drawing/CAD 2(1,3) Overview of practices specific to packaging design. Introduces drawing fundamentals and computer software as a means of technical drafting and creative expression. Focuses on perception, 2-D rendering, 3-D rendering, and graphic design programs.

PKGSC 299 Creative Inquiry—Packaging Science 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. To be taken Pass/Fail only.

PKGSC 320 Package Design Fundamentals 3(2,3) Study of specific package design concepts. Students understand how the design affects manufacturing processes, costs, and protective functions; begin skill development using hand-drawing and model packages; then move to software-based design and real packages. *Preq:* CTE 180, PKGSC 204, 206.

PKGSC 368, H368 Packaging and Society 3(3,0) Study of the role of packaging in society as it specifically relates to the responsibilities of the packaging scientist in protecting people and the environment. Includes study of packaging and environmental regulations and guidelines currently in place to achieve these goals. Ability to make informed decisions and ethical judgments is an encompassing goal.

PKGSC 399 Creative Inquiry—Packaging Science 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. To be taken Pass/Fail only.

PKGSC 401, 601 Packaging Machinery 3(3,0) Systematic study of types of machinery used to form, fill, seal, and handle various packaging, products, and packaging materials. Emphasizes basic mechanical, electrical, pneumatic, and hydraulic components of packaging machinery along with packaging machinery terminology. Discusses methods for machine line optimization and layout. *Preq:* PKGSC 204, PHYS 208, or consent of instructor.

PKGSC 403 Packaging Career Preparation 1(1,0) Preparation for a successful career in Packaging Science by completing the professional e-portfolio, and finalizing a résumé and career e-portfolio. Refines career skills through role playing. Topics include presentations, interviewing, effective collaboration and communication, business and foreign travel etiquette. *Coreq:* PKGSC 420, second semester senior standing or consent of instructor.

PKGSC 404, H404, 604 Mechanical Properties of Packages and Principles of Protective Packaging 3(3,0) Study of the mechanical properties of products and packages and standard methods of determining these properties. Focuses on the functional properties of packages related to shock and vibration isolation and compression. *Preq:* MTHSC 106, PHYS 207, PKGSC 204, or consent of instructor.

PKGSC (FD SC) 409 Total Quality Management for the Food and Packaging Industries 3(3,0) See FD SC 409.

PKGSC 416, 616 Application of Polymers in Packaging 4(3,3) Detailed study of polymer science and engineering as applied to packaging science. Includes polymer morphology, rheology, physical properties, processing methods, and polymerization. Emphasizes relationships among processing, structure, and properties. *Preq:* PKGSC 204, 206; CH 201 or 223; PHYS 207; or consent of instructor.

PKGSC 420, 620 Package Design and Development 3(2,3) Study of the principles and methods practiced in designing and developing packages and packaging systems and of methods used to coordinate and analyze package development activities including interfacing with product development, manufacturing, marketing, purchasing, and accounting. *Preq:* Second semester Senior standing; PKGSC 320, 368, 401, 404, 416, 430, 440, 464, or consent of instructor.

PKGSC 421 Special Problems in Packaging Science 1-4(0,3-12) Independent research investigations in packaging science related to packaging materials, machinery, design, and applications. Special emphasis is placed on organizing a research proposal, conducting research, and reporting results. May be repeated for a maximum of 15 credits. *Preq:* Consent of instructor.

PKGSC 422 Selected Topics in Packaging Science 1-3(1-3,0) Comprehensive study of selected topics in packaging science not covered in detail or contained in other courses. Contemporary developments in each area are stressed. May be repeated for a maximum of 15 credits, but only if different topics are covered. *Preq:* Consent of instructor.

PKGSC 430, 630 Converting for Flexible Packaging 3(1,6) Study of materials, methods, processes, and equipment used in converting web materials for flexible packaging. Laboratory provides hands-on experience preparing and operating pilot-scale converting equipment. *Preq:* PKGSC 204, 206; or consent of instructor.

PKGSC 440, 640 Packaging for Distribution 3(3,0) Packages are exposed to various shipping methods and numerous hazards during distribution. To ensure adequate product protection, packaging professionals need to understand the fundamental principles of distribution packaging design. Topics include ASTM and ISTA packaging test methods, packaging design guidelines for distribution, terminology, transport modes, distribution hazards, and protective packaging materials. *Preq:* PKGSC 454 or consent of instructor.

PKGSC 454, 654 Product and Package Evaluation Laboratory 1(0,3) Laboratory experiments to determine properties of packaging materials and to evaluate the response of packages and products to shock, vibration, and compression. Students operate standard testing equipment and become familiar with industry recognized test methods and standards. *Preq:* PKGSC 404 (or concurrent enrollment).

PKGSC 464, H464, 664 Food and Health Care Packaging Systems 4(3,3) Characteristics, engineering properties, and applications of various materials and systems used in the packaging of foods, pharmaceuticals, and medical devices. Packaging systems for specific food and medical applications are considered. Laboratory and field exercises on food and medical packaging operations and packaging materials are included. Emphasis is on evaluation methods. *Preq:* PKGSC 201, 204, 206, or consent of instructor.

PKGSC 499 Creative Inquiry—Packaging Science 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. To be taken Pass/Fail only.

PAN AFRICAN STUDIES

Associate Professor: A. A. Bartley

P A S 101 Africa and the Atlantic World 3(3,0) Study of Africa and its impact on the culture and life of peoples in the New World. Traces the impact Africans have had on shaping the music, language, dress, art, religion, and culture of the Western world.

P A S 301 Introduction to Pan African Studies 3(3,0) Study of African American experience from an Afrocentric perspective from colonial America to the present.

P A S 400 Studies in Pan African Studies 3(3,0) Study of selected topics or themes in Pan African Studies. Allows for individualized study of specific topics related to Pan African Studies such as music, dance, religion, colonization, slavery, or economic development. May be repeated for a maximum of six credits, but only if different topics are covered.

P A S 410 Studies in Africana Experience 3(3,0) Looks at the impact of Africans or African Americans on U.S. society. Interdisciplinary course that allows for the study of Africans and their descendants from a variety of perspectives. Focuses primarily on the United States. May be repeated for a maximum of six credits, but only if different topics are covered.

P A S 471 Directed Studies on the Black Experience in Education 1-3(1-3,0) Students conduct research and produce scholarship on academic, social, and historical issues that impact the Black experience in educational settings. Students may also participate in service learning activities to broaden their understanding and apply their knowledge in the community. May be repeated for a maximum of nine credits.

P A S 498, 698 Seminar on Pan African Studies 3(3,0) Research/writing seminar on the African American experience. Selected topics and themes from 1900 to present. *Preq:* HIST 311, 312, or 339, P A S 301.

PARKS, RECREATION AND TOURISM MANAGEMENT

Professors: L. R. Allen, S. J. Backman, R. H. Becker, F. A. McGuire, N. M. Porter, D. J. Thomason, D. E. Weatherford, B. A. Wright, *Chair*; *Associate Professors:* K. F. Backman, R. D. Bixler, W. C. Norman; *Assistant Professors:* D. M. Anderson, S. G. Arthur-Banning, E. B. Baldwin, A. L. Cory, J. C. Hallo, C. O. Oh, R. B. Powell, G. P. Ramshaw, D. L. Schmalz; *Senior Lecturer:* B. W. Stevens; *Lecturers:* D. M. Anderson, R. S. Brookover, L. E. Conrad, C. L. Goasguen, R. A. Lucas, A. R. Savedra

PRTM 101 Concepts of Leisure 3(3,0) Introduces recreation professions and organizations: government, voluntary, and commercial; overviews professional preparation; outlines development of man's uses of leisure and evolution of recreation, city parks, natural resources conservation, and preservation movements as philosophical forces affecting leisure services. Restricted to Parks, Recreation and Tourism Management majors.

PRTM 195 PGM Seminar I 1(1,0) Covers career planning and professional development training needed in the golf industry with special emphasis on topics covered in the PGA/PGM Level I Training Program. *Preq:* PRTM 281, consent of instructor

PRTM 198 Creative Inquiry—Parks, Recreation and Tourism Management I 1-4(1-3,1-12) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

PRTM 200 The Profession and Practice in Parks Recreation, and Tourism Management 1(1,0) Introduces students to the Parks, Recreation and Tourism Management field. Covers the history and development of the PRTM profession, including professional organizations, current issues and trends, ethical principles and professionalism, and professional competencies and development. To be taken Pass/Fail only.

PRTM 201, H201 The Recreation/Leisure Environment 3(3,0) Discusses the development characteristics of built and natural environmental resource settings for recreation, tourism development, and community expression. Examines human/environment interactions during leisure, including the impact of the recreation environment on people and the impact of people on the recreation environment. Surveys public agencies and private interests in these settings.

PRTM 205 Program and Event Planning 3(2,2) Principles and methods of program development. Time and facility utilization for sports activities, social functions, arts and crafts, outdoor activities, hobbies or special-interest groups, and activities in the cultural and performing arts are pursued. *Preq:* PRTM 101.

PRTM 206 Practicum I 1(0,3) Students conduct a recreation program in a supervised setting. A minimum of 90 hours with a leisure agency approved by the University is required. To be taken Pass/Fail only. *Preq:* PRTM 205, Sophomore standing in Parks, Recreation and Tourism Management.

PRTM 207 Practicum II 1(0,3) Continuation of PRTM 206. Experience in a leisure situation different from the PRTM 206 exposure. A minimum of 90 hours with a leisure agency approved by the University is required. To be taken Pass/Fail only. *Preq:* PRTM 205, Sophomore standing in Parks, Recreation and Tourism Management.

PRTM 210 Serving Diverse Populations in Parks, Recreation and Tourism Management 3(3,0) Introduces students to the leisure patterns and constraints of diverse constituents, including members of ethnic and racial minorities, people of diverse socioeconomic status, women, older adults, people with disabilities, and people with alternative lifestyles. *Preq:* PRTM 101.

PRTM 211 Impacts of Technology and Science in the Context of Play, Recreation and Tourism 3(3,0) Examines the relationship among society, technology, and tourism and recreation. Introduces theories of play, recreation and tourism as they relate to social concerns. Students learn how science and technology have impacted how people play, recreate and travel.

PRTM 220 Conceptual Foundations of Parks, Recreation and Tourism 2(2,0) Introduces students to the conceptual foundations of play, recreation, and leisure as they relate to contemporary society, the lifespan, and the natural environment. *Preq:* PRTM 200.

PRTM 221 Delivery Systems for Parks, Recreation and Tourism 2(2,0) Introduces students to the various roles, interrelationships, and importance of leisure service delivery systems in designing and operating programs and facilities to serve diverse populations. Also includes discussion of the role and impact of leisure services and community and economic development. *Preq:* PRTM 200.

PRTM 222 Program and Event Planning in Parks, Recreation and Tourism 3(2,1) Introduces concepts, principles, and skills necessary to plan, implement, and evaluate leisure and recreation programs and events. Topics include assessing needs, developing goals and objectives, selecting programs, events, and resources, marketing, venues, implementation, evaluation, group dynamics and leadership techniques. *Preq:* PRTM 200.

PRTM 223 Administration/Management in Parks, Recreation and Tourism 4(3,1) Covers the concepts, principles, and skills of administration/management as they relate to leisure and recreation services. Topics include the fundamental principles of research and data analysis, management, human resources management, supervisory leadership, budgeting and financial management, marketing, professional communication, technology, and facility planning and operations. *Preq:* PRTM 200.

PRTM 224 Legal Aspects of Parks, Recreation and Tourism 2(2,0) Introduces legal foundations and legislative processes, contracts and tort law, regulatory agents and methods of compliance, safety, emergency, and risk management as they relate to recreation, park resources, and leisure services. *Preq:* PRTM 200.

PRTM 241 Introduction to Community Recreation, Sport and Camp Management 3(3,0) Conceptual examination of community recreation, including the history and structure of public and private nonprofit recreation agencies with an emphasis on programs and services, career opportunities, funding mechanisms, the role of government, and current trends and issues impacting delivery of services. *Preq:* PRTM 101.

PRTM 254 Introduction to Sport Management 3(3,0) Development of a conceptual understanding of sport management, career opportunities in sport management, and the necessary competencies for the different career fields.

PRTM 270, H270 Introduction to Recreation Resources Management 3(3,0) Fundamentals of recreation resources management are presented to include the framework of management, management of specific resources, management of visitors, and management of services.

PRTM 281 Introduction to Golf Management 3(2,3) Development of a conceptual understanding of the golf industry, career opportunities in professional golf management, and specific introductory competencies utilized within the field. *Preq:* Professional Golf Management concentration and consent of instructor.

PRTM 282 Principles of Golfer Development 3(3,0) Introduction to golf instruction. Provides knowledge and skills necessary to develop successful golf programs. *Preq:* PRTM 281 or consent of instructor.

PRTM 283 Advanced Methods of Teaching Golf 3(3,0) Provides students with the knowledge and skills necessary to succeed as golf instructors. Particular emphasis is on golf swing mechanics, learning styles and motivation theory, the business of teaching golf, and the use of advanced technology in golf instructions. *Preq:* PRTM 282.

PRTM 295 PGM Seminar II 1(1,0) Introduction to the golf industry, professionalism, and current issues of interest in the industry with special emphasis on topics covered in the PGA/PGM Training Program Level I. *Preq:* PRTM 195.

PRTM 298 Creative Inquiry—Parks, Recreation and Tourism Management II 14(1-3,1-12) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

PRTM 301 Recreation and Society 3(3,0) Investigation of the role of recreation in a technological and work-oriented society. Particular emphasis is on recreation behavior, resources, and programming in public and private organizations that serve the public wants. Not open to Parks, Recreation and Tourism Management majors; may not be substituted or otherwise used to meet Parks, Recreation and Tourism Management area requirements. *Preq:* 2.0 cumulative grade-point ratio.

PRTM 304 Challenge Course Facilitation 3(2,2) Develops knowledge and skill in planning, directing, and evaluating group performance in an adventure challenge course environment; emphasis is placed on low and high ropes elements, processing, assessment, safety, and course management. *Preq:* 2.0 cumulative grade-point ratio.

PRTM 305 Safety and Risk Management in Parks, Recreation and Tourism Management 3(3,0) Provisions of safe services, facilities, and activities in the parks, recreation, and tourism domain are studied through the application of germane concepts from the areas of safety, risk management, and liability. *Preq:* PRTM 321, Junior standing, 2.0 cumulative grade-point ratio.

PRTM 307 Facility Planning and Operations 3(3,0) Introduction to recreation facility planning and operations processes. Design, planning, financing, construction, budgeting, personnel, operating policies and procedures, maintenance, and equipment considerations are covered. *Preq:* 2.0 cumulative grade-point ratio.

PRTM 308, H308 Leadership and Group Processes in Recreation 3(3,0) Leadership is analyzed through experience-based learning. Examines various styles of leadership and communication and their probable consequences. Considers techniques for planning large and small group meetings. Examines literature in the field of leadership and group processes. *Preq:* 2.0 cumulative grade-point ratio.

PRTM 309 Behavioral Concepts in Parks, Recreation and Tourism 3(3,0) Studies social psychological concepts concerning leisure behavior in various park, recreation, and tourism settings. Students learn to apply those theories and behavioral concepts required to understand and manage leisure activities and environments. *Preq:* PRTM 101, 2.0 cumulative grade-point ratio, consent of instructor.

PRTM 311, H311 Therapeutic Recreation 3(3,0) Examination of the profession of therapeutic recreation by analyzing the history, philosophy, concepts, roles, and functions involved in the therapeutic recreation services. *Preq:* 2.0 cumulative grade-point ratio.

PRTM 317 Group Initiatives 3(2,2) Examination and development of initiative modalities used by therapeutic recreators to teach teamwork, problem-solving communication, goal setting, leadership and personal interaction to diverse populations in a variety of settings. *Preq:* 2.0 cumulative grade-point ratio.

PRTM 318 Leisure Lifestyle Management 3(3,0) Examines principles and techniques applicable to guiding disabled as well as nondisabled individuals in an exploration of leisure needs, barriers, consequences, and accessibility. *Preq:* 2.0 cumulative grade-point ratio.

PRTM 320, H320 Recreation Policymaking 3(3,0) Structures and processes for public park and/or recreation policy formation in the United States. *Preq:* 2.0 cumulative grade-point ratio.

PRTM 321, H321 Recreation Administration 3(3,0) Analysis of the internal organization of a recreation department dealing with finances and accounting, records and reports, publicity and public relations, state and federal legislation, staff organization, coordination of community resources. *Preq:* PRTM 308, Junior standing, 2.0 cumulative grade-point ratio.

PRTM 325 Global Perspectives in Leisure, Recreation and Tourism 3(3,0) Advanced topics in serving diverse populations in Parks, Recreation and Tourism Management. Multicultural and global perspectives on leisure, recreation and tourism, and ways in which recreation serves as a tool for appreciation and respect of other cultures. *Preq:* Consent of instructor.

PRTM 330, H330 Visitor Services and Interpretation 3(3,0) Introduces the philosophy and principles of the art of environmental interpretation. Comprehensive survey of interpretive theory as it applies to the recreation and parks practitioner and the varying settings within the profession. *Preq:* 2.0 cumulative grade-point ratio.

PRTM 342, H342 Introduction to Tourism 3(3,0) Survey of travel and tourism in the United States with focus on terminology, demographics, financial significance, and trends. *Preq:* 2.0 cumulative grade-point ratio.

PRTM 343 Spatial Aspects of Tourist Behavior 3(3,0) Spatial patterns of national and international leisure travel destinations are explored and analyzed regarding their tourism attractiveness. *Preq:* 2.0 cumulative grade-point ratio.

PRTM 344 Tourism Markets and Supply 3(3,0) Acquaints students with the principles of matching tourism markets and supply. Students examine the strategies used in developing markets. *Preq:* 2.0 cumulative grade-point ratio.

PRTM 345 Tourism Management 3(3,0) Examines the management issues associated with offering tourism products and experiences to travelers by the private and public sectors for the purpose of enhancing visitor opportunities, making a profit and affecting change in a destination.

PRTM 346 Heritage Tourism 3(3,0) Heritage is an important part of tourism and can be the focal point of many journeys. Students are introduced to key concepts and issues in heritage tourism, including management of heritage tourism resources, politics of heritage tourism and the relationship between heritage tourism and authenticity.

PRTM 349 Survey of Tourism Sites 1(0,3) On-site study of various exemplary components of the travel and tourism industry in the Southeast. There are additional costs to students to cover travel. To be taken Pass/Fail only. *Preq:* PRTM 342, Junior standing in Parks, Recreation and Tourism Management, 2.0 cumulative grade-point ratio, consent of instructor.

PRTM 351 Risk Management and Certifications in Parks, Recreation and Tourism Management 3(2,2) Reviews basics of risk management relative to the administration of recreation programs. Certifies students in Red Cross Wilderness First Aid, First Aid for Sports, and CPR for the Professional Rescuer.

PRTM 352 Camp Organization and Administration 3(3,0) Surveys the development and trends of camping in America. Considers programming for the operations of agency and private camps. Enables students to master the techniques of group living. Laboratory offers practical experience in camp craft including trips and outdoor cooking. *Preq:* 2.0 cumulative grade-point ratio.

PRTM 380 Community Recreation in South Carolina 3(1,4) Students study indoor and outdoor recreation facilities, governmental jurisdiction, funding, programming, management, and staffing at community recreation agencies throughout South Carolina during a hands-on five-day field trip. *Preq:* PRTM 101, 2.0 cumulative grade-point ratio, or consent of instructor.

PRTM 383 Golf Shop Operations 3(3,0) Provides students with the knowledge and skills necessary to succeed as managers of golf shops. Particular emphasis is on fundamental business planning, development of policies and procedures, merchandising, inventory control, pricing, and customer service. *Preq:* PRTM 282, 2.0 cumulative grade-point ratio.

PRTM 390 Independent Study in Parks, Recreation and Tourism Management 1-3(1-3,0) Comprehensive studies and investigation of special topics not covered in other courses. Emphasizes field studies, community service, and independent readings. May be repeated for a maximum of six credits. *Preq:* Junior standing, 2.0 cumulative grade-point ratio, consent of instructor.

PRTM 391 Selected Topics in Parks, Recreation and Tourism Management 2-3(2-3,0) In-depth examination of developing trends in parks, recreation, and tourism that warrant timely study. May be repeated twice for a maximum of six credits, but only if different topics are covered. *Preq:* Junior standing, 2.0 cumulative grade-point ratio.

PRTM 392 Special Event Management 3(3,0) Students acquire an in-depth knowledge about the field of special event management. Planning techniques, strategies, and requirements for planning, implementing, and evaluating community events are included. Emphasizes ordinances, planning, funding, and marketing. *Preq:* 2.0 cumulative grade-point ratio.

PRTM 395 PGM Seminar III 1(1,0) Covers business planning for golf operations and customer relations emphasizing topics covered in the PGA/PGM Training Program Level II checkpoint. *Preq:* PRTM 295, 2.0 cumulative grade-point ratio.

PRTM 398 Creative Inquiry—Parks, Recreation and Tourism Management III 1-4(1-3,1-12) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

PRTM H399 Introduction to Field Training and Research 1(1,0) For students pursuing departmental honors, provides an initial orientation to the internship and research requirements including identification of a faculty mentor to supervise these activities. *Preq:* PRTM 207, consent of instructor.

PRTM 402 Professional Golf Management Alternative Internship 3(0,3) Under the guidance of a qualified professional supervisor, students gain practical experience and apply knowledge acquired in the classroom to the workplace. May be repeated for a maximum of six credits. *Preq:* PRTM 206, 207 and 404; Parks, Recreation and Tourism Management major in the Professional Golf Management Concentration; and approval of advisor.

PRTM 403 Elements of Recreation and Park Planning 3(3,0) Basic recreation and park planning principles, processes, and trends in area and facility development combine to form the basis for formulation of a relevant knowledge of planning. *Preq:* Senior standing, 2.0 cumulative grade-point ratio.

PRTM 404 Field Training I 1(1,0) Preparation for field training experience, including topics such as résumé development, interviewing techniques, internship agency selections, and responsibilities of the student, department, and agency. To be taken Pass/Fail only. *Preq:* PRTM 206, 2.0 cumulative grade-point ratio, consent of instructor. *Coreq:* PRTM 207.

PRTM 405 Field Training II 6(0,18) Minimum ten weeks (400 hours) of uninterrupted, supervised work in a park, recreation or tourism management agency. Under agency supervision, students observe, organize, and implement activities, events, and programs. To be taken Pass/Fail only. *Preq:* PRTM 206, 207, 404; Senior standing in Parks, Recreation and Tourism Management; 2.0 cumulative grade-point ratio; consent of instructor.

PRTM 407 Personnel Administration in Parks, Recreation and Tourism Management 3(3,0) Study of personnel administration practices in recreation agencies, including employee selection, training, motivation, rewards, evaluation, and legal issues related to personnel and supervision. *Preq:* PRTM 321, 2.0 cumulative grade-point ratio.

PRTM H408 Honors Internship 6(0,18) Minimum of 400 hours of uninterrupted, supervised work in a park, recreation, or tourism setting. Written report on observations, special project, or research is required in compliance with a contract between student and course instructor. *Preq:* PRTM H399, consent of instructor.

PRTM 409, H409 Methods of Recreation Research I 3(3,0) Analysis of the principal methods of recreation research, the application of descriptive statistics to recreation research, and the development of a research proposal. *Preq:* EX ST 301; Senior standing in Parks, Recreation and Tourism Management; 2.0 cumulative grade-point ratio; or consent of instructor.

PRTM 410, H410 Methods of Recreation Research II 3(3,0) Continuation of PRTM 409; includes supervised execution and reporting of results of research proposal developed in PRTM 409 and the application of inferential statistics to research. *Preq:* PRTM 409, 2.0 cumulative grade-point ratio, consent of instructor.

PRTM 412, H412, 612 Therapeutic Recreation and Mental Health 3(3,0) Therapeutic recreation services in mental health clinics, institutions, and outdoor settings. Review of disorders and current modes of treatment as they relate to therapeutic recreation. *Preq:* PRTM 311, 2.0 cumulative grade-point ratio, consent of instructor.

PRTM 416 Leisure and Aging 3(3,0) Examines the role of leisure services in later life, the needs of community-based and institutionalized elderly, and the development of service-delivery systems to meet those needs. *Preq:* 2.0 cumulative grade-point ratio.

PRTM 417 Therapeutic Recreation Processes I 4(3,2) Examination of models, principles, and procedures applicable to comprehensive program planning, specific program plans, individualized care plans, activity analysis, documentation, and evaluation. *Preq:* PRTM 311 or consent of instructor, three credit hours of human anatomy and physiology, 2.0 cumulative grade-point ratio.

PRTM 418 Therapeutic Recreation Processes II 4(3,2) Examination of theories and concepts that guide therapeutic recreation interventions, including knowledge and use of communication skills, therapeutic relationships, counseling theories, and group processing techniques. *Preq:* PRTM 311 and 417 or consent of instructor, 2.0 cumulative grade-point ratio.

PRTM 419 Therapeutic Recreation and Aspects of Disability Across the Lifespan 3(3,0) Examination of characteristics and diagnoses of individuals with various disabilities (cognitive, affective, and/or psychomotor domains) across the lifespan. Application of theories and concepts that guide therapeutic recreation interventions as well as examination of disability theory and concepts. *Preq:* PRTM 311; BIOSC 222 and 223 or equivalent; or consent of instructor; 2.0 cumulative grade-point ratio.

PRTM 420 Therapeutic Recreation Trends and Issues 3(3,0) Advanced principles and practices of therapeutic recreation, including philosophy, ethics, professional development, standards of practice, certification, recreation inclusion, and marketing services. *Preq:* PRTM 416, 418 or consent of instructor, 2.0 cumulative grade-point ratio.

PRTM 421, H421, 621 Recreation Financial Resources Management 3(3,0) Analysis of recreation financial resources management. Deals with revenue sources and their allocation. *Preq:* PRTM 321, Senior standing in Parks, Recreation and Tourism Management; 2.0 cumulative grade-point ratio.

PRTM (GEOG) 430, 630 World Geography of Parks and Equivalent Reserves 3(3,0) Major international patterns in the provision and use of urban and rural parks and recreation are examined. *Preq:* 2.0 cumulative grade-point ratio.

PRTM 431, 631 Methods of Environmental Interpretation 3(2,3) Practice and instruction in the use of equipment and methods available to the interpreter in public contact work. Coaching in presentation and evaluation of live programs and in design, execution, and evaluation of mediated programs is the major emphasis. Programs are delivered to public audiences in the Clemson area. *Preq:* PRTM 330; Senior standing in Parks, Recreation and Tourism Management; 2.0 cumulative grade-point ratio; consent of instructor.

PRTM 441, 641 Commercial Recreation 3(3,0) Components of offering leisure services and products to the public by individuals, partnerships, and corporations for the purpose of making a profit. *Preq:* 2.0 cumulative grade-point ratio.

PRTM 444, 644 Tour Planning and Operations 3(3,0) Provides the opportunity to understand the psychology of touring, with emphasis on packaged and group tours and how tours of different types and scale are planned, organized, marketed, and operated. *Preq:* PRTM 342, 2.0 cumulative grade-point ratio, consent of instructor.

PRTM 445, 645 Conference/Convention Planning and Management 3(3,0) Provides the opportunity to understand the problems of and solutions to conference and convention planning and management from both the sponsoring organization's and facility manager's perspectives. *Preq:* 2.0 cumulative grade-point ratio.

PRTM 446, 646 Community Tourism Development 3(3,0) Provides a community-based perspective of organizational, planning, development, and operational needs for a successful tourism economy at the local level. *Preq:* PRTM 342, 2.0 cumulative grade-point ratio, consent of instructor.

PRTM 447, 647 Perspectives on International Travel 3(3,0) Using the United States as a destination, international travel patterns and major attractions are presented. Factors which restrain foreign travel to the United States are analyzed. *Preq:* 2.0 cumulative grade-point ratio.

PRTM 451 Seminar in Community Recreation, Sport and Camp Management 3(3,0) Capstone course of case studies applied to management issues focused on community recreation, sport and camp management. *Preq:* PRTM 206, 207, 405.

PRTM 452, 652 Campus Recreation 3(3,0) Study of the basic components required for administration of successful college union and intramural-recreation sport programs. *Preq:* 2.0 cumulative grade-point ratio.

PRTM 453 Sports Information and Event Management 3(3,0) Introduction to basic techniques, tools, and procedures associated with sports information and event management activities. Focuses on the application of sports information and event management activities building upon knowledge from personal interviews, selected readings, event management brochures and field experience. *Preq:* PRTM 254, 2.0 cumulative grade-point ratio, consent of instructor.

PRTM 454 Trends in Sport Management 3(3,0) Examination of trends in the sport management area that allows PRTM majors to obtain an updated knowledge base of the field. Students are able to relate their academic studies to the current trends, problems, and management strategies confronting and being used within the sport management industry. *Preq:* PRTM 254, 2.0 cumulative grade-point ratio, consent of instructor.

PRTM 455 Advanced Program Planning 3(3,0) Advanced recreation programming techniques with an emphasis on funding, outcome measurement, customer service, program development, marketing, specialized populations, and current trends and issues impacting the delivery of recreation programs. *Preq:* PRTM 205, 2.0 cumulative grade-point ratio, or consent of instructor.

PRTM 460 Leisure Across the Lifespan 3(3,0) Introduces students to ways in which leisure affects human development and human development affects leisure behavior. *Preq:* PRTM 205, 309, 2.0 cumulative grade-point ratio.

PRTM 474, H474 Advanced Recreation Resources Management 3(3,0) Advanced topics in recreation resource management focusing on management strategies and techniques for addressing common resource and social problems in recreation resource management. Case studies and problem analysis are emphasized. *Preq:* PRTM 270, Senior standing, 2.0 cumulative grade-point ratio.

PRTM 483 Golf Club Management and Operations 3(0,9) Focuses on activities related to merchandising, purchasing and selling, inventory management, vendor selection, pricing strategies, strategies for monitoring sales and inventory related to financial control and customer service. Students are exposed to the responsibilities of a golf professional at a full-service golf club facility. *Preq:* 2.0 cumulative grade-point ratio. *Coreq:* CO-OP 104 and 105.

PRTM 490 Senior Independent Study 1-3(1-3,0) In cooperation with and under supervision of a faculty member, students develop and execute a field study or community project. May be repeated for a maximum of six credits. *Preq:* Senior standing, 2.0 cumulative grade-point ratio, consent of instructor.

PRTM 495 PGM Seminar IV 1(1,0) Covers golf shop merchandising and inventory management and supervising and delegating. Emphasizes topics covered in the PGA/PGM Training Program Level III checkpoint. *Preq:* PRTM 395, 2.0 cumulative grade-point ratio.

PRTM 498 Creative Inquiry—Parks, Recreation and Tourism Management IV 1-4(1-3,1-12) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

PRTM H499 Presentation of Honors Projects 1(1,0) Under direction of a faculty supervisor, students prepare and deliver oral presentations on projects that were carried out in PRTM H407 or H410. *Preq:* PRTM H407 or H410, consent of instructor.

PERFORMING ARTS

Professors: R. E. Goodstein, *Chair*; M. J. Charney, L. U. Harder, D. J. Hartmann, D. R. Rash; *Associate Professors:* L. L. Li-Bleuel, P. L. Buyer, L. Dzuris, N. M. Hosler, A. R. Levin, M. J. Spede; *Assistant Professors:* H. Altstatt, K. L. Johnson, A. M. Penna, B. A. Whisler; *Lecturers:* M. T. Anderson, H. D. Bannister, J. Bleuel, I. Brachitta, C. Collins, D. Conley, M. S. Craig, C. Goodloe, C. Hosler, L. F. Kibler, B. Leonard, K. W. Moore, L. Odom, L. Parsons, S. Robert, P. E. Savas, D. E. Stevenson, L. T. Warlick, R. T. Willey, R. Williamson

P A 101 Introduction to Performing Arts 3(3,0) Overview of performing arts, including performance, careers, technology, production, management, community outreach, safety, sales, and marketing. *Preq:* Performing Arts major. *Coreq:* P A 103.

P A 103 Portfolio I 1(0,3) Students develop discipline-specific portfolios that display creative design and contain samples of work that demonstrate integrated learning. *Coreq:* P A 101.

P A 195 Creative Inquiry—Performing Arts 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

P A 201 Performing Arts Seminar I 3(2,3) Study of selected performing arts topics. Includes seminars and masterclasses with faculty and visiting artists and concert and theatre attendance and evaluation. Emphasis is placed on written communication skills. *Preq:* P A 101, Sophomore standing.

P A 279 Performing Arts Practicum I 1(0,3) Practical work on performing arts presentations including backstage technical work, multimedia support, and arts management. *Preq:* P A 101.

P A 280 Performing Arts Practicum II 1(0,3) Continuation of practical work on performing arts presentations, with more specialized opportunities for backstage technical work, multimedia support, and arts management training. *Preq:* P A 279.

P A 295 Creative Inquiry—Performing Arts 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

P A 301 Principles of Arts Administration 3(2,3)
Continuation of P A 201 with added focus on critical and ethical analysis of performing arts. Emphasis is placed on oral communication skills. *Preq:* P A 201, Junior standing.

P A 395 Creative Inquiry—Performing Arts 1-4(1-4,0)
In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

P A 398 Special Topics in Performing Arts 1-3(1-3,0) Select areas of study in performing arts not addressed by other performing arts course offerings. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* P A 101 and consent of instructor.

P A 399 Internship 1-3(0,3-9) Provides performing Arts majors an opportunity to apply technical, managerial, and artistic concepts in a performing arts environment through preplanned, preapproved, faculty-supervised internships. Minimum of 45 hours of work per credit hour. May be repeated for a maximum of six credits. To be taken Pass/Fail only. *Preq:* P A 279 and consent of Internship Program Coordinator.

P A 401 Senior Capstone Project 4(3,3) Capstone course for Performing Arts majors. Students research, prepare, execute and assess a substantial project for the community as approved by a faculty committee. Students, with faculty guidance, manage all aspects of the project. *Preq:* P A 301, Senior standing. *Coreq:* P A 403.

P A 403 Portfolio II 1(0,3) Students revise discipline-specific portfolios through use of current technologies. Further demonstration of integrated learning is provided with the incorporation of senior project research content from P A 401. *Coreq:* P A 401.

P A H491 Performing Arts Honors Research 3(3,0)
Research for the preparation of an honors project. *Preq:* P A 301 or consent of instructor.

P A H492 Performing Arts Honors Project 3(3,0)
Preparation and presentation of an honors project. *Preq:* P A 491, consent of department chair and project advisor.

P A 495 Creative Inquiry—Performing Arts 1-4(1-4,0)
In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

P A 499 Independent Studies 1-3(1-3,0) Supervised study for students with special interests in performing arts outside the scope of existing courses. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.

PHILOSOPHY

Professors: W. A. Maker, *Chair*; T. G. May, S. Silvers; *Associate Professors:* D. Perpich, S. A. Sattris, K. C. Smith, C. B. Starkey, D. E. Wueste; *Assistant Professors:* A. A. Thompson; *Lecturers:* A. W. Garnar, D. L. Stegall

PHIL 101, H101 Introduction to Philosophic Problems 3(3,0) Discussion of representative philosophical questions that arise from human thought and action. Characteristic topics are values, knowledge, human nature, and society.

PHIL 102, H102 Introduction to Logic 3(3,0)
Introduction to methods of evaluating arguments. Gives simple valid argument forms, which can be joined together to produce the logical form of virtually any argument. Informal fallacies may also be considered.

PHIL 103, H103 Introduction to Ethics 3(3,0)
Philosophical consideration of the nature of ethics, basic ethical issues, and problems and modes of ethical reasoning.

PHIL 105 Introductory Seminar in the Big Questions 3(3,0) Introductory seminar dealing with a single important philosophical question such as "Who are we?" "What is the meaning of life?" "Are we free or determined?" Question is pursued throughout the semester with active student involvement. Questions may vary from semester to semester.

PHIL 124 Technology and Its Discontents 3(3,0)
Philosophical introduction to issues arising from the development of technologies, their implementation, and their integration into society. Considers theoretical questions regarding the nature of technology and its evaluation, as well as issues related to specific technologies.

PHIL 201 Responsibilities in Leadership 3(3,0)
Exploration of the responsibilities leaders have to those who are being led, to those on whose behalf they are leading, to those affected by leadership decisions and actions. Focuses on the relationship between responsibility and authority and the role of judgment in the exercise of leadership.

PHIL 210 Evolution and Creation 3(3,0) A critical comparison of evolution and creationism. Students examine the scientific, philosophical, and theological issues this clash brings to light, develop their ability to think through the various claims and counter claims critically, and then articulate a coherent position for themselves. Credit toward a degree will be given for only one of PHIL 210 or BIOL 210.

PHIL 225 Art and Logic of Scientific Reasoning 3(3,0) Examines applications and misapplications of inductive reasoning and causal inference in scientific explanation and everyday discourse. Topics include correlation and confirmation, natural laws, natural kinds, scientific explanation, causal inference, and experimental methods.

PHIL 303 Philosophy of Religion 3(3,0) Critical consideration of the meaning and justification of religious beliefs. Representative topics are the nature and existence of God, religious knowledge, religious language, the problem of evil.

PHIL 304 Moral Philosophy 3(3,0) Study of moral problems, their origin in conflicts between duty and desire, and alternative solutions proposed by classical and contemporary writers.

PHIL 305 Existentialism 3(3,0) Inquiry into the core themes of existentialism: freedom, meaningfulness or meaninglessness of life, the existence of God, etc. Representative thinkers from the existentialist tradition, such as Dostoyevsky, Kierkegaard, Sartre, and de Beauvoir, are studied.

PHIL (CHIN) 312 Philosophy in Ancient China 3(3,0) Study of the history of Chinese philosophy from fifth century B.C.E. including Confucianism, Daoism, Moism, legalism, Buddhism, Neo-Daoism, and Neo-Confucianism. Examination of Chinese philosophers' views and arguments on questions of life and death, history and society, education and personal cultivation. May not be used to satisfy general foreign language requirements.

PHIL (CHIN) 313 Philosophy in Modern China 3(3,0) Study of the history of Chinese philosophy from the 19th century to the present, including Neo-Confucianism, Conservatism, Liberalism, Nationalism, and Chinese Marxism. Examination of the conflict and fate of traditional and modern values in China. All readings and discussions are in English. May not be used to satisfy general foreign language requirements.

PHIL 314 Comparative Topics in Eastern and Western Philosophy 3(3,0) Study of issues and areas of overlapping concern to Eastern and Western philosophical traditions (e.g., ontology, ethics) with emphasis on both contrasts and convergences in philosophical approaches. Topics may vary.

PHIL 315 Ancient Philosophy 3(3,0) Origins and development of rationality as found in the thought of selected philosophers such as Socrates, Plato, and Aristotle.

PHIL 316 Modern Philosophy 3(3,0) Development of the modern view as seen in major Western philosophers of the 16th, 17th, and 18th centuries. Thought of Berkeley, Descartes, Hume, Leibniz, Locke, and Spinoza may be considered to illustrate the development of rationalism and empiricism.

PHIL 317 Nineteenth-Century Philosophy 3(3,0)
Development of 19th-century philosophy emphasizing selected works of philosophers such as Kant, Hegel, Marx, Nietzsche, and Kierkegaard.

PHIL 318 Twentieth-Century Philosophy 3(3,0)
Historical overview of selected significant movements in 20th-century Western philosophy such as Continental and/or analytic philosophy.

PHIL 320 Social and Political Philosophy 3(3,0)
Critical consideration of the views of some major philosophers on the nature of the individual's relation to society and the state in the context of their wider philosophical (logical, epistemological, metaphysical, and ethical) doctrines. Philosophers may include Plato, Aristotle, Augustine, Hobbes, Rousseau, Mill, Marx, Hegel, Rawls, and Nozick.

PHIL 321 Crime and Punishment 3(3,0) Investigates what sorts of conduct should be criminalized and what society should do with those who engage in criminal activity. Specific topics may include the enforcement of morals, euthanasia, hate crimes, deterrence, retribution, and restitution.

PHIL 323 Theory of Knowledge 3(3,0) Examination of concepts, criteria, and decision procedures underlying rational belief and the justification of knowledge claims. Representative answers to the problem of skepticism are considered, with special attention to some leading theories of knowledge.

PHIL 324 Philosophy of Technology 3(3,0) Examines technology and representative philosophical assessments of it with a focus on understanding its impact on the human condition.

PHIL 325 Philosophy of Science 3(3,0) Philosophical study of problems generated by science, but that are not themselves scientific, such as what comprises a scientific theory; how scientists formulate theories and acquire knowledge; what, if anything, differentiates science from other ways of knowing; what role concepts play in scientific knowledge; whether scientific progress is rational.

PHIL 326 Science and Values 3(3,0) Examination of several features of the relation between science and values. Topics may include ethical and social obligations of scientists, role of value judgements in scientific practice, and influence of social and political values on science and scientists.

PHIL 327 Philosophy of Social Science 3(3,0) Inquiry into the philosophical foundations of social science, in particular questions of objectivity, explanatory structure, causality, agency, normativism and naturalism, and social determination of knowledge.

PHIL 328 Philosophy and Technology of the Body 3(3,0) Examines the interrelation of human bodies and emerging technologies in light of philosophical notions of human nature, personal identity, and the ethical dignity of the human. Emphasizes the influence of social values on scientific and technological developments and the reciprocal impact of these developments on understandings of the body.

PHIL 330 Contemporary Issues in Philosophy 3(3,0) Examination of a variety of issues of broad concern to philosophers today. Issues may vary. May be repeated once for credit with departmental consent.

PHIL 333 Metaphysics 3(3,0) Examination of issues and problems concerning the ultimate nature of reality. Topics may include the appearance/reality distinction, the nature of existence, freedom and determinism, personal identity, idealism, and realism.

PHIL 340 Technology, Environment, and Sustainability 3(3,0) Philosophical examination of how technology contributes to significant environmental change. Considers role of science in justifying claims about (for example) global climate change, role of technology in responding to these changes, how technology affects relations between humans and the extra-human world, and ethical implications of various kinds of technology.

PHIL 343 Philosophy of Law 3(3,0) Explanation of the nature of legal theory and the law through a critical examination of the basic concepts and principles of these fields.

PHIL 344 Business Ethics 3(3,0) Study of ethical issues created by business activities, relating them to fundamental questions of ethics generally. Representative topics may include hiring, firing, promotions, business and minorities, organizational influence in private lives, consumer interests, economic justice, and reindustrialization.

PHIL 345 Environmental Ethics 3(3,0) Study of ethical problems in our dealings with the rest of nature and of how they relate to ethics in general. Representative topics include the basis of ethics, nature and intrinsic value, duties to future generations, economics and the environment, rare species, animal rights, ethics and agriculture, energy doctrine.

PHIL 346 Medical Ethics 3(3,0) Examines ethical dilemmas facing modern medicine. Topics may include controversies surrounding death, reproductive technologies, abortion, allocation of resources, the concept of disease, the doctor-patient relationship, and medical research.

PHIL 347 Ethics in Architecture 3(3,0) Interdisciplinary course focused on the architectural profession and the practices of design, building, and other processes in a social and business context. Consideration is given to both general moral principles and particular case studies.

PHIL 348 Philosophies of Art 3(3,0) Examines some of the predominant attempts to understand art in ancient and modern philosophy and also considers a variety of contemporary views and controversies about the nature, meaning, value, and future of art.

PHIL (W S) 349 Theories of Gender and Sexuality 3(3,0) Examines the philosophical dimensions of contemporary debates about the relation of sex, gender, and sexuality.

PHIL (NURS) 350 Technology and Philosophy in Nursing 3(3,0) See NURS 350.

PHIL 351 Philosophy of Emotion 3(3,0) Considers a range of classic and contemporary readings on the nature and function of emotion. Topics include cognitive, physiological, and constructionist approaches to understanding emotion, emotion and reason, emotion and morality, and select individual emotions.

PHIL 355 Philosophy of Mind and Cognitive Science 3(3,0) Critical examination of philosophical and scientific theories of mental phenomena and of the relationship between mental and material phenomena. Theories of Mind-Body Dualism, Monism, Functionalism, Eliminative and Reductive Materialism, Connectionism, and the status of folk psychology versus cognitive neuroscience are studied.

PHIL 360 Symbolic Logic 3(3,0) Introduction to the basic concepts of modern symbolic logic, including the symbolization of statements and arguments and the techniques of formal proof.

PHIL 370 Philosophy of War 3(3,0) Examines war from both ethical and strategic perspectives: the nature of a just war, the aims of war, and the kinds of general strategies appropriate for achieving those aims.

PHIL 375 Minds and Machines 3(3,0) Examines controversial questions in artificial intelligence and the Computational Theory of Mind. Topics may include "Can machines think?" "What's involved in being able to think?" "Can machines reason, understand, be conscious, be self-aware, learn, be creative, have emotions, and use natural language?" Focus is on manmade computers and the mind as computer.

PHIL (REL) 393 Science and Religion 3(3,0) See REL 393.

PHIL 399 Philosophy Portfolio 2(2,0) Creation of a digital portfolio to demonstrate competence in reasoning, critical thinking, and problem solving skills as well as ethical judgment. Course also serves as a resource for academic and professional development. *Preq:* Junior standing in Philosophy.

PHIL 401, 601 Studies in the History of Philosophy 3(3,0) In-depth study of a selected philosopher, philosophical school, or movement. Topics vary. With departmental consent, may be repeated once for credit. Current topics and course descriptions are available in the department's course offering brochure. *Preq:* Consent of instructor.

PHIL 402, 602 Topics in Philosophy 3(3,0) Thorough examination of a particular philosophical topic, issue, or problem. Topics vary. May be repeated once for credit with departmental consent. Current topics and course descriptions are available in the department's course offering brochure. *Preq:* Consent of instructor.

PHIL 406, 606 Continental Philosophy for Architects 3(3,0) Examines contemporary Continental philosophy over the course of the 20th century with the goal of offering the proper theoretical background to architecture students who use such theory in their studies and design work.

PHIL 422 Anarchism 3(3,0) Philosophical study of the roots of anarchist thought and its current articulations.

PHIL 425, 625 Philosophy of Psychology 3(3,0) Detailed examination of psychology as an autonomous science. Issues include explanation in psychology and cognitive neuroscience, psychology naturalized as a "special science" comparable to biology and geology, evolutionary psychology, philosophy and psychopathology, and moral issues in psychology. *Preq:* Nine hours of psychology or consent of instructor.

PHIL (A A H) 433, 633 Issues in Contemporary Art and Philosophy 3(3,0) Examines the intersections between recent developments in art and those in philosophy and critical theory. Course content varies, but examples are Postmodernism in Art and Philosophy, Themes of Resistance in Contemporary Culture.

PHIL 485, 685 Topics in Philosophy of Biology 3(3,0) Detailed analysis of a selected topic in philosophy of biology/theoretical biology. Topics may include the levels of selection debate, sociobiology, genetic explanation and genetic causation, the species question, and the history and sociology of biology. *Preq:* Eight credit hours of biology or consent of instructor.

PHIL 490 Law, Liberty and Justice Prelaw Internship 1-3(0,3-9) Faculty-supervised internship designed for students in the Law, Liberty and Justice emphasis area of the Philosophy major. Interns are placed with law offices or with institutions and agencies in fields related to law and social policy. May be repeated for a maximum of six credits. To be taken Pass/Fail only. *Preq:* Philosophy major, Junior standing and consent of internship coordinator.

PHIL 492 Creative Inquiry—Philosophy 1-4(1-4,0) Small group work on particular issues with emphasis on involving students in research. Content varies. May be repeated for a maximum of nine credits. *Preq:* Consent of instructor.

PHIL H497 Philosophy Honors Research 3(3,0) Students conduct research, clearly define the topic, and complete an annotated bibliography under the supervision of the thesis advisor. *Preq:* Consent of department chair and thesis advisor.

PHIL H498 Philosophy Honors Thesis 3(3,0) In consultation with the thesis advisor and committee, students write, revise, defend, and complete the thesis. *Preq:* PHIL H497 and consent of department chair and thesis advisor.

PHIL 499, 699 Independent Study 1-3(1-3,0) Course of study designed by the student in consultation with a faculty member who agrees to provide guidance, discussion, and evaluation of the project. Student must confer with the faculty member prior to registration. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

PHYSICAL SCIENCE

PHSC 107 Introduction to Earth Science 4(3, 3) Survey of topics in geology, meteorology, astronomy, and oceanography, emphasizing comprehension and practical application of earth science concepts to experiments and activities appropriate for the elementary school classroom. Enrollment priority will be given to Early Childhood and Elementary Education majors.

PHSC 108 Introduction to Physical Science 4(3, 3) Survey of topics in chemistry and physics emphasizing comprehension and practical application of physical science concepts to experiments and activities appropriate for the elementary school classroom. Enrollment priority will be given to Early Childhood and Elementary Education majors.

PHYSICS

Professors: P.A. Barnes, Chair; M.S. Daw, D.H. Hartmann, M. F. Larsen, M. D. Leising, P. J. McNulty, J. W. Meriwether, B. S. Meyer, A. M. Rao, T. M. Tritt; *Associate Professors:* E. Alexov, P. J. Flower, J. R. King, G. A. Lehmacher, D. C. Marinescu; *Assistant Professors:* S. Brittain, F. Drymioris, J. He, H. Kang, P-C Ke, C. E. Sosolik, M. Spano, S. Tewari

PHYS 101 Current Topics in Modern Physics 1(0,2) Demonstrations and lectures serving as an introduction to different areas of physics and astronomy are presented by various members of the staff. May include such topics as astrophysics, energy, relativity, and weather, as well as visits to the planetarium.

PHYS 122, H122 Physics with Calculus I 3(3,0) First of three courses in a calculus-based physics sequence. Topics include vectors, laws of motion, conservation principles, rotational motion, oscillations, and gravitation. Credit for a degree will be given for only one of PHYS 122, 200, or 207. *Coreq:* MTHSC 106.

PHYS 124 Physics Laboratory I 1(0, 3) Introduction to physical experimentation with emphasis on mechanical systems, including oscillatory motion and resonance. Computers are used in the experimental measurements and in the statistical treatment of data. *Coreq:* PHYS 122.

PHYS 199 Creative Inquiry—Physics and Astronomy 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

PHYS 200 Introductory Physics 4(3,2) Introduction to classical physics. Includes elements of mechanics, heat, electricity, and light. May not be substituted for PHYS 122, but may be substituted for PHYS 207, only with the approval of the Department of Physics and Astronomy. Credit for a degree will be given for only one of PHYS 122, 200, or 207. *Coreq:* MTHSC 105 or equivalent.

PHYS 207 General Physics I 3(3,0) Introductory course for students who are not majoring in physical science or engineering. Covers such topics as mechanics, waves, fluids, and thermal physics. Credit for a degree will be given for only one of PHYS 122, 200, or 207. *Coreq:* MTHSC 105 or equivalent.

PHYS 208 General Physics II 3(3,0) Continuation of PHYS 207. Covers such topics as electricity, magnetism, electromagnetic waves, optics, and modern physics. Credit for a degree will be given for only one of PHYS 208 or 221. *Preq:* PHYS 207. *Coreq:* PHYS 210.

PHYS 209 General Physics I Laboratory 1(0,2) Introductory laboratory course for students who are not majoring in physical science or engineering. Covers such topics as mechanics, waves, fluids, and heat. *Coreq:* PHYS 207.

PHYS 210 General Physics II Laboratory 1(0,2) Covers such topics as electricity, magnetism, electromagnetic waves, optics, and modern physics. *Preq:* PHYS 207, 209. *Coreq:* PHYS 208.

PHYS 221, H221 Physics with Calculus II 3(3,0) Continuation of PHYS 122. Topics include thermodynamics, kinetic theory of gases, electric and magnetic fields, electric currents and circuits, and motions of charged particles in fields. Credit for a degree will be given for only one of PHYS 208 or 221. *Preq:* PHYS 122.

PHYS 222, H222 Physics with Calculus III 3(3,0) Continuation of PHYS 221. Topics include wave motion, electromagnetic waves, interference and diffraction, relativity, atomic particles, and atomic and nuclear structure. *Preq:* PHYS 221.

PHYS 223 Physics Laboratory II 1(0,3) Experiments in heat and thermodynamics, electrostatics, circuits, and magnetism. Computers are used in statistical treatment of data. *Coreq:* PHYS 221.

PHYS 224 Physics Laboratory III 1(0,3) Experiments involve atomic, molecular, and nuclear systems. Wave particle dualism of light and matter is emphasized. Calculators and computers are used in statistical treatment of data. *Coreq:* PHYS 222.

PHYS 240 Physics of the Weather 3(3,0) Descriptive introduction to meteorology. Includes atmospheric thermodynamics, solar radiation, heat budget, atmospheric circulation, force laws governing air motion, fronts, precipitation, synoptic prediction. Special topics of current interest, such as the effect of environmental pollution on weather and the effect of weather on health, are included.

PHYS 290 Physics Research 1-3(0,3-9) Individual research project in any area of experimental or theoretical physics or astronomy supervised by a physics or astronomy faculty member. Project need not be original but must add to students' ability to carry out research. May be repeated for a maximum of six credits. *Preq:* Minimum grade-point ratio of 3.0; consent of instructor.

PHYS 299 Creative Inquiry—Physics and Astronomy 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

PHYS 300, H300 Introduction to Research 1(2,0) Acquaints students with current research in physics. Seminars are provided where research activities in various areas of physics and astronomy are summarized. Provides a basis for students to choose a suitable topic for a senior thesis. *Preq:* Junior standing in Physics.

PHYS 311 Introduction to the Methods of Theoretical Physics 3(3,0) Survey of methods and techniques of problem-solving in physics. Emphasizes the application of mathematical techniques to the solution of problems of vectors, fields, and waves in mechanics, electromagnetism, and quantum physics. *Preq:* PHYS 222 or consent of instructor.

PHYS 312 Methods of Theoretical Physics II 3(3,0) Continuation of PHYS 311 focused on introducing various mathematical notions widely used in upper level physics courses, such as differential equations, special functions and complex numbers, and complex functions. *Preq:* PHYS 311 or consent of instructor.

PHYS 321, H321, 621 Mechanics I 3(3,0) Statics, motions of particles and rigid bodies, vibratory motion, gravitation, properties of matter, flow of fluids. *Preq:* PHYS 221.

PHYS 322, H322, 622 Mechanics II 3(3,0) Dynamics of particles and rigid bodies, Lagrangian and Hamiltonian formulations, vibrations of strings, wave propagation. *Preq:* PHYS 321 or consent of instructor.

PHYS 325, H325 Experimental Physics I 3(1,4) Introduction to experimental modern physics, measurement of fundamental constants, repetition of crucial experiments of modern physics (Stern-Gerlach, Zeeman effect, photoelectric effect, etc.). *Coreq:* PHYS 321 or consent of instructor.

PHYS 326, H326 Experimental Physics II 3(1,4) Continuation of PHYS 325.

PHYS 355, H355 Modern Physics 3(3,0) Study of the topics of modern physics, including relativity, atomic physics, quantum mechanics, condensed-matter physics, nuclear physics, and elementary particles. *Preq:* PHYS 222, MTHSC 206, or consent of instructor.

PHYS 356 Modern Physics Overview 1(1,0) Overview of topics in modern physics, including a short description of the structure of solids, nuclear physics, and particle physics. *Preq:* PHYS 222 or consent of instructor.

PHYS 399 Creative Inquiry—Physics and Astronomy 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

PHYS 401, H401 Senior Thesis 1-3 Semi-original theoretical, experimental, or computational research project performed under the direction of a faculty member. Fields available include astronomy, astrophysics, atmospheric physics, biophysics, high energy physics, relativity, solid state physics, and statistical mechanics. May be repeated for a maximum of six credits. *Preq:* Nine credits of physics at the 300-400 level.

PHYS 417, H417, 617 Introduction to Biophysics I 3(3,0) Introduction to the application of physics to biological problems. Topics include review of elementary chemical and biological principles, physics of biological molecules, and fundamentals of radiation biophysics. *Preq:* MTHSC 206, PHYS 221, or consent of instructor.

PHYS 420, 620 Atmospheric Physics 3(3,0) Study of physical processes governing atmospheric phenomena. Topics include thermodynamics of dry and moist air, solar and terrestrial radiative processes, convection and cloud physics, precipitation processes, hydrodynamic equations of motion and large-scale motion of the atmosphere, numerical weather prediction, atmospheric electricity. *Preq:* MTHSC 108, PHYS 208 or 221.

PHYS 432, H432, 632 Optics 3(3,0) Covers a selection of topics, depending on the interest of the student. Topics may include the formation of images by lenses and mirrors, design of optical instruments, electromagnetic wave propagation, interference, diffraction, optical activity, lasers, and holography. *Preq:* PHYS 221.

PHYS 441, H441, 641 Electromagnetics I 3(3,0) Study of the foundations of electromagnetic theory. Topics include electric fields, electric potential, dielectrics, electric circuits, solution of electrostatic boundary-value problems, magnetic fields, and magnetostatics. *Preq:* PHYS 221 and MTHSC 208, or consent of instructor.

PHYS 442, H442, 642 Electromagnetics II 3(3,0) Continuation of PHYS 441. Study of foundations of electromagnetic theory. Topics include magnetic properties of matter, microscopic theory of magnetization, electromagnetic induction, magnetic energy, AC circuits, Maxwell's equations, and propagation of electromagnetic waves. Other topics may include waves in bounded media, antennas, electrodynamics, special theory of relativity, and plasma physics. *Preq:* PHYS 441 or consent of instructor.

PHYS 445 Solid State Physics I 3(3,0) Topics include an overview of crystal structures, chemical and atomic bonding, and periodicity in relation to solid materials. Covers electronic, thermal, and magnetic properties of materials, electrical conduction in metals and semiconductors. Overview of the role of electrons and phonons and their interactions is presented. *Preq:* PHYS 455 or consent of instructor.

PHYS 446, H446, 646 Solid State Physics II 3(3,0) Continuation of PHYS 445, including selected topics in solid-state physics such as optical properties, superconductivity, non-crystalline solids, dielectrics, ferroelectrics, and nanomaterials. Plasmons, polarons, and excitons are discussed. Brief introduction into methods of solid-state synthesis and characterization tools is presented. *Preq:* PHYS 445 or consent of instructor.

PHYS 452, H452, 652 Nuclear and Particle Physics 3(3,0) Study of our present knowledge concerning subatomic matter. Experimental results are stressed. Topics include particle spectra, detection techniques, Regge pole analysis, quark models, proton structure, nuclear structure, scattering and reactions.

PHYS 455, H455, 655 Quantum Physics I 3(3,0) Discussion of solution of the Schrodinger equation for free particles, the hydrogen atom, and the harmonic oscillator. *Preq:* PHYS 322 and 441, or consent of instructor.

PHYS 456, H456, 656 Quantum Physics II 3(3,0) Continuation of PHYS 455. Application of principles of quantum mechanics as developed in PHYS 455 to atomic, molecular, solid state, and nuclear systems. *Preq:* PHYS 455.

PHYS 465, H465, 665 Thermodynamics and Statistical Mechanics 3(3,0) Study of temperature development of the laws of thermodynamics and their application to thermodynamic systems. Introduction to low temperature physics is given. *Preq:* Six hours of physics beyond PHYS 222 or consent of instructor.

PHYS 475 Selected Topics 1-3(0-3,0-9) Comprehensive study of a topic of current interest in the field of physics. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of instructor.

PHYS 481 Physics of Surfaces 3(3,0) Introduction for advanced undergraduates to the physics and chemical physics of solid surfaces and to the interaction of atoms and molecules with those surfaces. *Preq:* PHYS 312, 322, 325, 326, 441, or consent of instructor.

PHYS 482 Surface Experiments 3(2,3) Introduction for advanced undergraduates to experimental methods of surface physics. Includes on-hands experience in advanced laboratory. *Preq:* PHYS 312, 322, 325, 326, 441, or consent of instructor.

PHYS 499 Creative Inquiry—Physics and Astronomy 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

PLANT PATHOLOGY

Professors: S. B. Martin, M. B. Riley, S. W. Scott;
Assistant Professors: P. Agudelo, J. Kerrigan

PL PA 213 Fungi and Civilization 3(3,0) Overview of how fungi affect the lives of humans, both currently and historically. Addresses the diversity of fungi and the tremendous roles fungi play on the planet with respect to the biological, social and ethical consequences. The general nature of this course makes it beneficial to all students.

PL PA 302, H302 Plant Pathology Research 1-3(0,3-9) Research experience in a plant pathology project for undergraduates who understand basic concepts of research. Students develop research objectives, procedures, and collect data. A written report includes interpretation of results. To be taken Pass/Fail only. *Preq:* Consent of instructor.

PL PA 310 Plant Diseases and People 3(2,3) Introduction to diseases caused by biotic and abiotic agents, symptom development, diagnosis, economics, control, and relationship of plant diseases to human welfare, including the uses of genetic engineering to develop disease resistant crops. *Preq:* BIOL 104/106 or equivalent.

PL PA (ENT) 406, 606 Diseases and Insects of Turfgrasses 2(2,0) Host-parasite relationships, symptomatology, diagnosis, economics, and control of infectious diseases of turfgrasses and life histories, diagnosis, and control of important insect pests of turfgrasses. *Preq:* ENT 301, PL PA 310, or equivalent; or consent of instructor.

PL PA (ENT) 408, 608 Diseases and Insects of Turfgrasses Laboratory 1(0,3) Laboratory to complement PL PA (ENT) 406 to learn symptomatology, diagnosis, and control of infectious diseases of turfgrasses and diagnosis of damage caused by important insect pests of turfgrasses. *Preq:* PL PA (ENT) 406.

PL PA 411, 611 Plant Disease Diagnosis I 2(1,2) Methods and procedures used in the diagnosis of plant diseases, especially late spring and early summer diseases. Basic techniques of pure culture and identification of plant pathogens and Koch's postulates are taught. Diagnosis of a wide variety of diseases of cultivated and wild plants is carried out. Offered summer session only. *Preq:* PL PA 310 or equivalent.

PL PA (BIOSC) 425, 625 Introductory Mycology 3(3,0) See BIOSC 425.

PL PA (BIOSC) 426, 626 Mycology Practicum 2(1,3) See BIOSC 426.

PL PA 459, 659 Plant Nematology 3(2,3) Introduction to nematodes emphasizing plant parasitic nematodes. Introduces morphology of nematodes as it relates to their taxonomic position and ability to cause diseases. Includes diagnosis and control of nematode diseases, along with use of nematodes in studies of molecular interaction and genetics involvement in developing resistance. *Preq:* PL PA 310 or consent of instructor.

PL PA 470, 670 Molecular Plant Pathogen Interactions 3(3,0) Study of the interactions of plants and pathogens at the molecular level. Investigates the molecular and genetic components of plant disease and how these can be used for improvement and understanding of how diseases occur and how these can be used for possible disease management. *Preq:* PL PA 310.

PLANT PHYSIOLOGY

Lecturer: K. C. Hall

PL PH (BIOSC) 340 Plant Medicine and Magic 3(3,0) Study of use of compounds of plant and fungal origin as poisons, hallucinogens, and pharmaceuticals. *Preq:* BIOL 104/106, CH 102, or consent of instructor.

POLITICAL SCIENCE

Professors: D. L. Bodde, X. Hu, W. Lasser, M. A. Morris, L. R. Olson, B. W. Ransom, J. E. Stewart Jr., C. B. Thompson, J. D. Woodard; *Associate Professors:* R. W. Smith, A. L. Warber; *Assistant Professors:* J. A. Fine, Z. Taydas, B. P. Turner; *Senior Lecturer:* V. Matic

PO SC 101, H101 American National Government 3(3,0) Introduction to American national government and politics examining topics such as the Constitution, federalism, political institutions, political behavior, and political participation.

PO SC 102, H102 Introduction to International Relations 3(3,0) Overview of both theory and practice in contemporary global politics. Topics include the structure of and primary actors in the international system; reasons conflict occurs; and roles of international institutions, law, and policy.

PO SC 104, H104 Introduction to Comparative Politics 3(3,0) Introduction to the study of comparative politics in the post-Cold War era, with emphasis on theories and applications. Topics include democratic and nondemocratic systems; ideology; political culture; party systems; and legislative, executive, and judicial structures.

PO SC 199 Introduction to Political Science 1(1,0) Introduction to political science as a discipline. Topics include an overview of the subfields within political science, core research methodologies and source materials, and ethical issues related to the study of political science. *Preq:* Political Science major.

PO SC 302 State and Local Government 3(3,0) Introduction to American state and local governments, including examination of nature and scope of non-national governments and their interaction with the U.S. federal system. Emphasis is on structural features, functions, and policies of non-national governments.

PO SC 305 Creative Inquiry—Political Science 1-3(1-3,0) Engages students in research projects selected by the Political Science Department faculty. Research projects vary depending on faculty and student interest. May be repeated for a maximum of six credits. Political Science majors may apply a maximum of three credits toward degree requirements. *Preq:* Consent of instructor.

PO SC 310 Political Science Internship 1-3(1-3,0) Off-campus internship for at least one semester or its equivalent. May be repeated for a maximum of three credits. No more than three hours credit from PO SC 310, 311, 312, 409, 410 may be applied toward a Political Science major or minor or a Global Politics minor. No more than six hours credit from PO SC 310, 311, 312 may be applied toward any other degree. *Preq:* PO SC 101 and consent of instructor.

PO SC 311 Model United Nations 1(0,1) Participation in United Nations simulation exercises in competition with other colleges and universities. May be repeated for a maximum of six credits; however, no more than three hours credit from PO SC 310, 311, 312, 409, 410 may be applied toward a Political Science major or minor or a Global Politics minor. No more than six hours credit from PO SC 310, 311, 312 may be applied toward any other degree. *Preq:* Consent of instructor.

PO SC 312 State Student Legislature 1(0,1) Participation in state student legislature simulation exercises in competition with other colleges and universities in the state. May be repeated for a maximum of six credits; however, no more than three hours credit from PO SC 310, 311, 312, 409, 410 may be applied toward a Political Science major or minor or a Global Politics minor. No more than six hours credit from PO SC 310, 311, 312 may be applied toward any other degree. *Preq:* Consent of instructor.

PO SC 321 Public Administration 3(3,0) Introduction to public administration, including the elements of organization, personnel and financial management, administrative law, and administrative responsibility. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 341 Quantitative Methods in Political Science 3(3,1) Introduction to quantitative research methods in political science. Topics include research design, measurement, data collection, sampling procedures, and applications of statistical techniques to research problems in political science. Also stresses computer use for elementary data analysis.

PO SC 343 The Mass Media in American Politics 3(3,0) Role and impact of the mass media in the American political system, emphasizing the media's role in shaping public opinion and in influencing government and public policy. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC (LANG) 350 Seminar in International News 3(3,0) See LANG 350.

PO SC (E L E, PSYCH, SOC) 356 Social Science of Entrepreneurship 3(3,0) See SOC 356.

PO SC 361, H361 International Politics in Crisis 3(3,0) Factors contributing to the prevalence of tension and conflict in the contemporary global arena are identified and analyzed, with particular emphasis on political, economic, and military elements. *Preq:* PO SC 102 or 104, Junior standing, or consent of instructor.

PO SC 362 International Organizations 3(3,0) Examines normative and institutional foundations of civil society. Explains the formal institutions, decision-making processes, and multilateral capacities of international governmental and nongovernmental organizations. *Preq:* PO SC 102 or 104, Junior standing, or consent of instructor.

PO SC 363 United States Foreign Policy 3(3,0) American foreign policy in historical perspective, with particular emphasis on decision-making process, contemporary American capabilities and challenges, and analysis of key issues. *Preq:* PO SC 102 or 104, Junior standing, or consent of instructor.

PO SC 367 Political Risk Assessment 3(3,0) Risks associated with conducting business and other activities in different countries, especially in the frequently unstable setting of the developing world. Major commercial providers of country risk assessment are identified and critiqued. *Preq:* PO SC 102 or 104, Junior standing, or consent of instructor.

PO SC 371 European Politics 3(3,0) Major emphasis on European governments and issues of importance in the European context. Current methods of comparison are studied and applied to the formal and informal functioning of European governments. *Preq:* PO SC 102 or 104, Junior standing, or consent of instructor.

PO SC 372 Political Culture of East Asia 3(3,0) Introduction to political culture that commonly characterizes East Asian countries, with emphasis on political subcultures of different nations, and on the analysis of the mutual influence between politics and culture. *Preq:* PO SC 102 or 104, Junior standing, or consent of instructor.

PO SC 375, H375 European Integration 3(3,0) Survey course analyzing increasing institutional cooperation between European countries with a focus on the European Union. *Preq:* PO SC 102 or 104, Junior standing, or consent of instructor.

PO SC 381 African American Politics 3(3,0) Examination of African American political thought, interests and agenda setting, and dynamics of African Americans' participation in political and governmental decision making. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC (SPAN) 382 Spanish-Language News 1(1,0) Weekly discussions of Spanish-language news articles in the foreign press with an emphasis on politics and on the connections among political, economic, social, and cultural trends. Emphasizes Spanish vocabulary as well as cross-cultural contrasts with the United States. May be repeated for a maximum of three credits. *Preq:* SPAN 202 or equivalent or consent of instructor.

PO SC (FR) 383 French-Language News 1(1,0) Weekly discussions of French-language news articles in the foreign press with an emphasis on politics and the connections among political, social, economic, and cultural trends. Emphasizes French vocabulary as well as cross-cultural contrasts with the United States. May be repeated for a maximum of three credits. *Preq:* FR 202 or equivalent or consent of instructor.

PO SC 389 Selected Topics 1-3(1-3,0) Study of a selected area of political science. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of instructor.

PO SC H395 Junior Honors Research Seminar 1(1,0) Readings and discussion to prepare for the Junior Research Paper and the Senior Thesis. *Preq:* Junior standing, membership in Calhoun Honors College, consent of instructor.

PO SC H396 Junior Honors Research 1(1,0) Readings and research in conjunction with an approved political science course at the 300 or 400 level. *Preq:* Junior standing, membership in Calhoun Honors College, and consent of instructor.

PO SC 403 United States Congress 3(3,0) Examination of the evolution of Congress, congressional elections, the organization of the legislative branch, congressional rules and procedures, decision making, styles of representation, and policymaking. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 405 The American Presidency 3(3,0) Examines the evolution of the presidency, the powers of the chief executive, the public presidency, executive branch organization and staffing, decision making, and political relations with Congress and the federal judiciary. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 407 Religion and American Politics 3(3,0) Examines the impact of religion on American politics, including an analysis of the role of religion in politics, political behavior of major religious groups, constitutional issues and voting behavior. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 409, 609 Directed Study in American Politics 1-3(1-3,0) Supervised reading and/or research in selected areas of American government. May be repeated for a maximum of six credits; however, no more than three hours credit from PO SC 310, 311, 312, 409, 410 may be applied toward a Political Science major or minor or a Global Politics minor. *Preq:* Consent of instructor.

PO SC 410 Directed Study in International Politics 1-3(1-3,0) Supervised readings and/or research in selected areas of international and comparative politics. No more than three hours credit from PO SC 310, 311, 312, 409, 410 may be applied toward a Political Science major or minor or a Global Politics minor. *Preq:* Consent of instructor.

PO SC 416, 616 Interest Groups and Social Movements 3(3,0) Empirical and normative examination of the origins, roles, and influence of interest groups and social movements in the United States and of the relationships among interest groups, social movements, and democratic theory. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 421, 621 Public Policy 3(3,0) Introduction to the major approaches to public policy making in American government. Topics include theories and models of policy making, the identification of policy problems, agenda setting, the formulation and adoption of policy, implementation, and program evaluation. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 423, 623 Urban Politics 3(3,0) Examines the nature and scope of politics in urban communities and offers an analysis of urban governance, especially in the interaction of public authority and private institutions in metropolitan areas. Emphasis is on the structure, processes, and problems challenging governments in urban America. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 424, 624 Federalism and Intergovernmental Relations 3(3,0) Introduction to the historical, theoretical, legal, and fiscal aspects of constitutionally divided government. Federal, state, and local division of responsibility for public services is emphasized, along with the emerging devolution of those responsibilities from the federal government to states and localities. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 427, 627 Public Management 3(3,0) Examination of emerging management problems and issues facing federal, state, and local government and the application of management principles, practices, and techniques of public administration. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 428, 628 National Security Policy 3(3,0) National security threats and policy decision making. Issues covered include weapons of mass destruction, terrorism, organized crime, narcotics, arms control, intelligence, and homeland security. Students deliberate and assess threat priorities and crisis management. *Preq:* PO SC 102 or 104, Junior standing, or consent of instructor.

PO SC 429, 629 Global Issues 3(3,0) Analysis, assessment, and management of the principal threats facing global security today. Topics include rogue nations, regional superpowers, alliances, organized crime, illegal weapons proliferation, and corruption. Emphasis is on the strategies available to the international community for dealing with these threats. *Preq:* PO SC 102 or 104; Junior standing; or consent of instructor.

PO SC 430 Public Policy Evaluation 3(3,0) Discussion of the role of policy analysis in government. Applications of analytical and computer tools to substantive policy areas such as transportation, economic/community development, education, poverty, and health. Students focus on assessing a policy from a set of options based on analytic criteria as well as developing policy alternatives. *Preq:* MTHSC 301 or PO SC 341 or equivalent.

PO SC 436 Law, Courts, and Politics 3(3,0) Introduces the principal features of the American legal system. Analyzes how and why legal actors and institutions operate as they do. Explores how the law functions as both a tool and an institution of government, as well as how the court system affects the formation and implementation of public policies. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 437, 637 American Constitutional Law: Rights and Liberties 3(3,0) Examination and analysis of Supreme Court decisions and other legal materials in the areas of civil rights and civil liberties, with an emphasis on freedom of speech, freedom of religion, equal protection of the laws, and privacy rights. *Preq:* Junior standing or consent of instructor.

PO SC 438, 638 American Constitutional Law: Structures of Government 3(3,0) Examination and analysis of Supreme Court decisions and other legal materials in the areas of national power, federalism, the separation of powers, and the role of the judiciary. *Preq:* Junior standing or consent of instructor.

PO SC 442, 642 Political Parties and Elections 3(3,0) Study of the distinctive features of the American two-party system with emphasis on presidential elections. Parties are examined as formal organizations, coalitions of voters and interest groups, coordinators of nomination and election processes, and managers of policy-making institutions. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 448 Studies in Political Economy 3(3,0) Political economy describes the relationship between social and political order and the production, consumption and trading of goods. Course introduces special topics on political economy and familiarizes students with the work of Smith, Ricardo, Marx, Weber and Hayek. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Junior standing.

PO SC 449 Political Theory of Capitalism 3(3,0) Examines the ethical foundations of capitalism. Focuses primarily on the major ethical theories that have supported or criticized capitalism throughout history. Topics include justification of private property, role of corporations, the profit motive, and the source of wealth creation. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 450 Political Theory 3(3,0) Moral concepts central to political life, including equality, freedom, community, and individualism. Emphasis is placed on the ideologies that express these concepts, including democracy, liberalism, conservatism, socialism, and Fascism. Philosophers covered range from Plato to Foucault. *Preq:* PO SC 101 or 102 or 104, Junior standing, or consent of instructor.

PO SC 453 American Political Thought 3(3,0) American political philosophy from the 17th century to the present with emphasis on political and social developments since the 1770s. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 454, 654 Southern Politics 3(3,0) Examination of the unique political environment of the American South, with emphasis on the events and social forces that have shaped politics in the region since World War II. Course material is approached from a variety of perspectives, including history, literature, social themes, and political culture. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 455 Political Thought of the American Founding 3(3,0) Intensive seminar on the principles and practices of America's founders (e.g., Washington, Adams, Jefferson, Madison, and Hamilton). Examines how American revolutionaries struggled between 1765 and 1788 to develop new ideas about rights, liberty, equality, constitutions, republicanism, separation of powers, representation, federalism, etc. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 456 Diplomacy: The Art of Negotiation 3(3,0) Examines the conduct of foreign policy in the historical and contemporary context. Explores theories and key concepts of international negotiation, offering a comparative look at the behavior and practice of major powers. *Preq:* PO SC 102 or 104, Junior standing, or consent of instructor.

PO SC 457, 657 Political Terrorism 3(3,0) Examination and analysis of the international phenomenon of terrorism in terms of origins, operations, philosophy, and objectives. *Preq:* PO SC 102 or 104, Junior standing, or consent of instructor.

PO SC 458, 658 Political Leadership 3(3,0) Comparative examination of political leaders, focusing particularly on types, methods, and consequences of leadership and on the relationship between leaders and followers. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 459 Ethnic Violence 3(3,0) Examination of both theories and case studies of ethnic violence in today's world, with emphasis on understanding potential strategies of conflict resolution. *Preq:* PO SC 102 or 104, Junior standing, or consent of instructor.

PO SC 461, 661 American Diplomacy and Politics 3(3,0) Analyzes the process of making and implementing strategies to protect and promote American national interests. Focuses on the role of government agencies and executive-legislative relations, as well as the participation and influence of interest groups and the media. Includes a five-day seminar in Washington, DC. *Preq:* PO SC 363 or consent of instructor.

PO SC 466 African Politics 3(3,0) Comprehensive survey of major regional blocks, as well as analysis of individual states and thematic concepts. *Preq:* PO SC 102 or 104, Junior standing, or consent of instructor.

PO SC 471 Russian Politics 3(3,0) Comprehensive examination of the Russian Federation since the fall of the Soviet Union. The successes and failures of democratic transition are analyzed, with topics covering political participation, organized crime and corruption, center-periphery conflict, and ethnic/religious unrest. *Preq:* PO SC 102 or 104, Junior standing, or consent of instructor.

PO SC 472 Japanese Politics 3(3,0) Concepts and operation of contemporary Japan's political system. Emphasis is on institution building and political economy after World War II. *Preq:* PO SC 102 or 104, Junior standing, or consent of instructor.

PO SC 473 Eurasian Politics 3(3,0) Examination of the areas of the Caucasus and Central Asia, covering themes that include democratization, globalization, terrorism, and stability. *Preq:* PO SC 102 or 104, Junior standing, or consent of instructor.

PO SC 476 Middle East Politics 3(3,0) Comprehensive thematic and empirical analysis of the Middle East region. Issues covered include democratization, political and religious freedom, oil, the role of women, and terrorism. States analyzed include Syria, Jordan, Iran, Iraq, Saudi Arabia, Turkey, and the Gulf States. *Preq:* PO SC 102 or 104, Junior standing, or consent of instructor.

PO SC 477 Chinese Politics 3(3,0) Concepts and operation of contemporary China's political system; emphasizes institutional innovation and political economy in recent reforms. *Preq:* PO SC 102 or 104, Junior standing, or consent of instructor.

PO SC 478 Latin American Politics 3(3,0) Survey of prominent trends in Latin American politics, with a focus on major countries in the region and major issues affecting the region. Relations between Latin America and the United States and other prominent countries are also considered. *Preq:* PO SC 102 or 104, Junior standing, or consent of instructor.

PO SC 480, 680 Gender and Politics 3(3,0) Examination of the role of gender in politics in the United States and in other countries. Particular emphasis on the role of women in electoral politics, issues of gender, women's rights as human rights, and feminist theory. *Preq:* PO SC 101, 102, or 104, Junior standing, or consent of instructor.

PO SC 482 The Political Novel and Film 3(3,0) Examination of political novels and films. Emphasizes the development of these media as art forms; the relationship between political novels and films and politics at large; and the role of these media in shaping public opinion. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC (LANG) 485, 685 Global Affairs and Governments 3(3,0) Designed for teachers and education students who wish to learn how to incorporate global affairs more fully into high school curricula. Overview of major topics involving foreign policies and world politics is provided.

PO SC 489, 689 Selected Topics 1-3(1-3,0) Intensive examination of a selected area of political science. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of instructor.

PO SC H490 Senior Honors Thesis Research 3(3,0) Reading and research related to the senior honors thesis. *Preq:* Senior standing, membership in Calhoun Honors College, and consent of instructor.

PO SC H491 Senior Honors Thesis 3(3,0) Research and writing of the senior honors thesis. *Preq:* Senior standing, membership in Calhoun Honors College, and consent of instructor.

PO SC 499 Professional Development in Political Science 1(1,0) Allows students to reflect on their experience as political science majors. Topics include understanding of cross-disciplinary issues, current research in political science, career options, and ethical issues related to the study of political science. To be taken Pass/Fail only. *Preq:* Senior standing in Political Science.

POLYMER AND FIBER CHEMISTRY

Professors: J. M. Ballato, D. A. Brosnan, M. S. Ellison, S. H. Foulger, G. C. Lickfield, I. A. Luzinov, H. J. Rack, K. A. Richardson, *Director, Associate Professors:* P. J. Brown, K. Kornev, J. Luo; *Assistant Professors:* V. Blouin, M. Kennedy, T. Mefford

PFC 303 Textile Chemistry 3(3,0) Study of the properties and reactions of aliphatic and aromatic organic compounds. Emphasizes mechanistic interpretations and the development of synthetic schemes leading to polyfunctional compounds of the types encountered in the textile industry. *Preq:* CH 102. *Coreq:* MTHSC 206 or 207.

PFC 304 Textile Chemistry 3(3,0) Fundamental principles of physical chemistry with emphasis on areas frequently encountered in the textile industry, including thermodynamics, kinetics, and solution properties. These concepts are applied to the study of organic compounds and organic reaction mechanisms. *Preq:* PFC 303.

PFC 305 Textile Chemistry Laboratory 1(0,3) Introduction to techniques used in synthesis and characterization of organic compounds. *Coreq:* PFC 303.

PFC 306 Textile Chemistry Laboratory 1(0,3) Techniques used in the measurement of the physiochemical properties of polymers and textile chemicals. *Coreq:* PFC 304.

PFC 405 Principles of Textile Printing 3(2,3) Development of modern textile printing systems is studied. Also examines colloidal requirements of colorants, thickener compositions, rheology of printing pastes, and various physical requirements necessary for a successful printing system in a modern plant. *Preq:* Consent of instructor.

PFC 406 Textile Finishing—Theory and Practice 3(2,3) Study of the application of chemicals to textile substrates and how they affect the substrate's physical and chemical properties. Emphasizes the theories of chemical modification of textiles as well as the technology of finishing.

PFC 415, H415, 615 Introduction to Polymer Science and Engineering 3(3,0) Chemistry of monomers and polymers and the chemical and physical properties of polymers are discussed emphasizing fiber forming, synthetic polymers. Includes molecular characterization, structure, morphology, and mechanical properties as they relate to the design of polymer systems for end uses in textiles, geotextiles, plastics and fiber-reinforced composite materials. *Preq:* CH 201 and 330 or 224, PFC 304, or consent of instructor.

PFC 416, 616 Chemical Preparation of Textiles 3(2,3) Chemicals used in the preparation of fabric for dyeing and finishing. Oxidizing and reducing agents and their control and effect on various fibers. Colloidal and surface active properties of various compounds and the fundamental factors influencing these properties.

PFC 417 Polymer and Fiber Laboratory 1(0,3) High molecular weight polymers are prepared from monomers, and their chemical and physical properties are measured as functions of critical end use parameters using instrumental and physical methods. *Coreq:* PFC 415.

PFC 457, H457, 657 Dyeing and Finishing I 3(3,0) Understanding of physical, chemical, and mechanical principles behind the application of colors and finishes to textiles. Requires an appreciation of fiber chemistry and morphology, dye and finish structures and reactivity and mechanical principles behind equipment used to effect transfer of these chemicals onto the textile substrate.

PFC 458, H458, 658 Dyeing and Finishing II 3(3,0) Kinetics and equilibria of dyeing processes. The use of conductivity, diffusion, and other methods useful for measuring absorption of isotherms and dyeing rates and the general thermodynamic relationships applicable to dyeing operations. Fiber properties such as zeta potential, dye sites, relative amorphous area available are included.

PFC 459 Dyeing and Finishing I Laboratory 1(0,3) Introduction to common dyeing and printing methods and to some of the machinery necessary to carry out dyeing operations. *Coreq:* PFC 457.

PFC 460 Dyeing and Finishing II Laboratory 1(0,3) Covers finishing in addition to dyeing operations and their instrumental control. *Coreq:* PFC 458.

PFC 461, 661 Surface Phenomena in Fiber Science 3(3,0) Introduction to surface phenomena focusing on fiber science. Fundamentals of interfacial phenomena embrace thermodynamics of surfaces, physics of adhesion, wetting, and finishing emphasizing specific features associated with interactions of liquids and chemicals with fibers and fibrous materials. *Preq:* Junior standing in engineering or science.

PORTUGUESE

PORT 101 Elementary Portuguese 4(3,1) Introduction to speaking, listening, and writing. Attention is given to the sound system of Portuguese to develop basic communication skills.

PORT 102 Elementary Portuguese 4(3,1) Continuation of PORT 101. *Preq:* PORT 101 or consent of instructor.

PORT 201 Intermediate Portuguese 3(3,0) Intermediate course with more emphasis on communication skills and structure. Reading and writing practice in and outside the classroom, with special attention to idiomatic usage. Introduction to perspectives through readings and cultural activities. *Preq:* PORT 102 or consent of instructor.

PORT 202 Intermediate Portuguese 3(3,0) Continuation of PORT 201. *Preq:* PORT 201 or consent of instructor.

PSYCHOLOGY

Professors: T. R. Alley, T. W. Britt, R. L. Campbell, B. M. King, L. Gugerty, R. M. Kowalski, J. A. McCubbin, D. D. Moore, J. W. Murdoch, E. R. Muth, C. C. Pagano, J. J. Pilcher, P. H. Raymark, *Interim Chair:* B. R. Stephens, F. S. Switzer III, M. A. Taylor, R. A. Tyrrell; *Associate Professors:* E. G. Brainerd Jr., C. L. S. Pury, R. R. Sinclair; *Assistant Professors:* J. O. Brooks, C. Cantalupo, P. S. Merriitt, C. H. Pak, P. J. Rosopa, H. M. Zinzow; *Senior Lecturer:* P. R. Alley

PSYCH 201, H201 Introduction to Psychology 3(3,0) Introduction to the study of behavior. Analysis of the biological bases of behavior, learning, thinking, motivation, perception, human development, social behavior, and the application of basic principles to more complex phenomena such as education, personal adjustment, and interpersonal relations.

PSYCH 202 Introductory Psychology Laboratory 1(0,2) Major phenomena and methods of psychology are illustrated and investigated in a series of laboratory modules. Students also explore career and academic development issues.

PSYCH 250 Pursuing Happiness 3(3,0) Introduces psychological theories and principles used to study human behavior (methods, cognition, motivation, etc.). The concept of happiness is investigated as a psychological construct across cultures. Offered summer session only.

PSYCH 275 Applied Psychology and Transportation 3(3,0) Introduces psychological principles used to study human behavior (methodological, cognitive, perceptual, etc.). These psychological principles, in addition to ethical, legal, and societal perspectives, are applied to transportation issues.

PSYCH 306 Human Sexual Behavior 3(3,0) The subject of sexual behavior is approached from the psychophysiological, behavioral, and cultural points of view. Evolutionary, historical, and cross-cultural perspectives are considered.

PSYCH 309 Introductory Experimental Psychology 4(3,2) Introduction to the analysis of data from experimental and correlational research in psychology. Emphasizes the applications and logical nature of statistical reasoning. Laboratory periods stress the techniques of data analysis using microcomputers. *Preq:* PSYCH 201 with a C or better or consent of instructor.

PSYCH 310 Advanced Experimental Psychology 4(3,2) Continuation of PSYCH 309. Focus is on techniques of empirical research (experiments, quasi-experiments, survey research, etc.) that are widely used in psychology. Students design and carry out their own empirical research projects. Extensive practice in the writing of reports is included. *Preq:* PSYCH 201 with a C or better, PSYCH 309, or consent of instructor.

PSYCH 320 Principles of Behavior 3(3,0) Study of basic learning principles including classical conditioning, operant conditioning, and modeling. Initial emphasis is on animal studies followed by human applications and techniques. *Preq:* PSYCH 201 with a C or better or consent of instructor.

PSYCH 324 Physiological Psychology 3(3,0) Study of human neuroanatomy with emphasis on the function of the nervous and endocrine systems. Discusses the biological basis of behavior in its normal and abnormal dimensions. *Preq:* PSYCH 201 with a C or better or consent of instructor.

PSYCH 325 Physiological Psychology Laboratory 1(0,3) Demonstrations and techniques of selected physiological procedures are presented to explain the principles discussed in PSYCH 324. *Coreq:* PSYCH 324.

PSYCH 330 Motivation 3(3,0) Various aspects of motivation are considered by studying physiological, emotional, and environmental influences on behavior. Orientation is empirical rather than theoretical with emphasis on pertinent research, applications, and measurement of motives. *Preq:* PSYCH 201 with a C or better or consent of instructor.

PSYCH 333 Cognitive Psychology 3(3,0) Study of higher-order mental processing in humans. Topics include memory, learning of concepts, problem solving, and the psychology of language. *Preq:* PSYCH 201 with a C or better or consent of instructor.

PSYCH 334 Laboratory in Cognitive Psychology 1(0,2) Selected experiments and demonstrations are conducted to reveal phenomena related to human perception, memory, reasoning, problem solving, and high-level mental processes. *Preq:* PSYCH 201 with a C or better and PSYCH 309, or consent of instructor. *Coreq:* PSYCH 333.

PSYCH 340, H340 Lifespan Developmental Psychology 3(3,0) Survey of current theory and research concerned with the psychological aspects of human growth and development across the entire lifespan. Major topics include developmental methods, physical maturation, cognition, socialization, personality, psycholinguistics, intelligence, learning, behavior problems, and exceptionality. *Preq:* PSYCH 201 with a C or better or consent of instructor.

PSYCH 344 Psychology of Adolescence 3(3,0) Study of the psychosocial processes of adolescence. Major emphasis is on personality development, growth of thinking, social and sexual maturation, and variations in adolescence. *Preq:* PSYCH 201 with a C or better or consent of instructor.

PSYCH 345 Adulthood and Aging 3(3,0) Special consideration of the major psychological processes of aging as they relate to individual behavior and adaptation. Includes the influences of aging on the body, learning and psychomotor skills, thinking and intelligence, employment and productivity, personality, and psychopathology. Opportunity for contact with institutionalized and noninstitutionalized elderly persons is provided. *Preq:* PSYCH 201 with a C or better or consent of instructor.

PSYCH 352, H352 Social Psychology 3(3,0) Survey course analyzing human social behavior from the perspective of the individual as a participant in social relationships. Major emphasis is on the study of such contemporary social processes as attitude formation and change, interpersonal relations, conformity, conflict resolution, aggression and violence, social communication, and group phenomena. *Preq:* PSYCH 201 with a C or better or consent of instructor.

PSYCH 355 Environmental Psychology 3(3,0) Considers the influences of the physical environment on human behavior. Topics include perception of and adaptation to the environment, effects of physical design on behavior, and individual reactions to environmental stressors. *Preq:* PSYCH 201 with a C or better or consent of instructor.

PSYCH (E L E, PO SC, SOC) 356 Social Science of Entrepreneurship 3(3,0) See SOC 356.

PSYCH 364 Industrial Psychology 3(3,0) Reviews perception of work from the pre-industrial revolution to the present. Comparative approaches to motivation, development, maintenance, and attraction of successful work behaviors are discussed. Topics include the organization's responsibilities to the community, implementing a disease- and accident-free workplace, and the effects of consumerism. *Preq:* PSYCH 201 with a C or better or consent of instructor.

PSYCH 368 Organizational Psychology 3(3,0) Analysis of individual behavior for the purpose of investigating problems in organizations and increasing organization effectiveness. Topics include psychological factors affecting communication, decision making, conflict, leadership, work stress, power, and organizational change. *Preq:* PSYCH 201 with a C or better or consent of instructor.

PSYCH 369 Leadership in Organizational Settings 3(3,0) Broad survey of theory and research on leadership in formal organizations. A detailed explanation and critical evaluation of major theories (including participative and charismatic leadership) are bridged with helpful remedies and prescriptions for effective leadership in organizations. *Preq:* PSYCH 201.

PSYCH 370 Personality 3(3,0) Historical and contemporary views of individual differences in behavior, affect, health, coping, and motivation. Covers topics such as personality development and structure, personality assessment, cross-cultural issues, and applications of personality psychology. *Preq:* PSYCH 201 with a C or better or consent of instructor.

PSYCH 375 Psychology of Substance Abuse 3(3,0) Study of the psychological approaches to treatment of substance abuse. Topics include behavioral, social learning, and family-systems theories as applied to treating substance abuse. Emphasis is on empirical approaches to evaluating methods of treatment and matching clients to treatments. *Preq:* PSYCH 201 with a C or better or consent of instructor.

PSYCH 383, H383 Abnormal Psychology 3(3,0) Introduction to the diagnosis and treatment of mental illnesses. Uses current diagnostic standards for mental disorders as a framework for understanding the symptoms, causes, and treatments of the most commonly observed maladaptive behaviors. *Preq:* PSYCH 201 with a C or better or consent of instructor.

- PSYCH H385 The Social Construction of Madness** 3(3,0) Study of the construct of mental illness and the variety of ways in which psychosis has been explained, portrayed, and treated over time. Interdisciplinary approach to examining representations of "madness" that shape a culture's understanding of mental illness and its treatment, including popular culture, art, and literature. *Preq:* PSYCH 201 with a C or better or consent of instructor.
- PSYCH H390 Honors Seminar in Psychology** 3(3,0) Variable topic seminar for Honors students from all majors. Topics are announced prior to registration for each semester. May be repeated once for credit, but only if different topics are covered. *Preq:* PSYCH 201 with a C or better or consent of instructor.
- PSYCH 408 Women and Psychology** 3(3,0) Explores the wide variety of psychological issues that concern women. Emphasizes empirical research on topics such as motherhood, sex differentiation, motivation, and psychological disorders. *Preq:* PSYCH 201 with a C or better or consent of instructor.
- PSYCH 415 Systems and Theories of Psychology** 3(3,0) Study of the development of psychology, particularly during the past 100 years. Emphasis is on giving students a better perspective of present-day psychology. Focus is on the various approaches taken by influential psychologists and the conflicts among these approaches. *Preq:* PSYCH 201 with a C or better and one 300-level PSYCH course, or consent of instructor.
- PSYCH 422, H422 Sensation and Perception** 3(3,0) Study of psychophysical techniques of measurement and sensory and perceptual processes related to vision, hearing, and the other senses. *Preq:* PSYCH 201 with a C or better and one 300-level PSYCH course, or consent of instructor.
- PSYCH 423 Sensation and Perception Laboratory** 1(0,2) Selected experiments are conducted to demonstrate the phenomena involved in sensation and perception. *Preq:* PSYCH 309 or consent of instructor.
- PSYCH 426, 626 Advanced Physiological Psychology** 3(3,0) Advanced studies of the biological basis of behavior with emphasis on functional neuroanatomy and endocrinology. Topics may vary. May not be repeated for credit. *Preq:* PSYCH 324 or consent of instructor.
- PSYCH 435 Human Factors Psychology** 3(3,0) Analyses of theoretical issues and research methods related to the interaction between people and machines and human performance. Topics include information processing theory, human control systems and displays, task simulation, perceptual and motor factors limiting human performance. *Preq:* PSYCH 201 with a C or better and one 300-level PSYCH course, or consent of instructor.
- PSYCH 443 Infant and Child Development** 3(3,0) Cognitive, emotional, and social development from conception through childhood (up to age 12). Major theories and research findings are covered. *Preq:* PSYCH 201 with a C or better and PSYCH 340, or consent of instructor.
- PSYCH 447 Moral Development** 3(3,0) Explores the development of moral reasoning, judgment, and character from a descriptive psychological point of view. Examines the theoretical and empirical work of Jean Piaget, Lawrence Kohlberg, and Elliot Turiel as well as prosocial, eudaemonistic, and cross-cultural alternatives to these ideas. *Preq:* PSYCH 201 with a C or better; PSYCH 340, 344, or 345; or consent of instructor.
- PSYCH 454 Psychology of Human Relationships** 3(3,0) Research, theory, and their practical applications regarding the development, maintenance, and dissolution of human relationships; understanding successful and unsuccessful relationships. Emphasis is on improving the individual's ability to relate to other persons both interpersonally and professionally. *Preq:* PSYCH 201 with a C or better and one 300-level PSYCH course, or consent of instructor.
- PSYCH 456 Applied Psychophysiology** 3(3,0) Explores the various measures used in psychophysiology to study mind-body interactions. Exposes students to the practice of psychophysiology through an integrated hands-on laboratory experience in which students learn about psychophysiological measures by applying them. *Preq:* PSYCH 201 or consent of instructor.
- PSYCH 459 Group Dynamics** 3(3,0) Review of current theory and research on small-group processes with special emphasis given to group formation and development, group structure, the dynamic forces within a group, leadership, and group problem solving and decision making. *Preq:* PSYCH 201 with a C or better and one 300-level PSYCH course, or consent of instructor.
- PSYCH 462, 662 Psychology and Culture** 3(3,0) Seminar examining the cultural context in which psychological theories and research are generated and psychological perspectives on human diversity. Topics include the philosophical positions influencing psychological theory and research; methodological issues in the study of diversity, historical and contemporary perspectives; and cross-cultural psychological research in selected content areas. *Preq:* PSYCH 310 or consent of instructor.
- PSYCH 471 Psychological Testing** 3(3,0) Introduction to the theory of psychological testing, emphasizing the principles of measurement and psychometric characteristics of a good psychological test. Issues in test development, administration, and interpretation are reviewed. Educational, industrial, and clinical uses of tests are examined. *Preq:* PSYCH 201 and 309, or consent of instructor.
- PSYCH 475, H475 Brain and Behavior: An Evolutionary Approach** 3(3,0) Examines the interactions between the human brain and behavior from an evolutionary perspective. Topics can include: hunger, stress, sleep, sexual attraction, memory, decision making, in-out groups, male-female interaction, and maladaptive behaviors. *Preq:* PSYCH 201 with a C or better, one 300-level psychology course, and junior-senior standing; or consent of instructor.
- PSYCH 480, 680 Health Psychology** 3(3,0) Study of the role of health-related behaviors in the prevention, development and/or exacerbation of health problems. Emphasis on the biopsychosocial model and its application in the assessment, treatment, and prevention of health problems. *Preq:* PSYCH 201 with a C or better and one 300-level PSYCH course, or consent of instructor.
- PSYCH 482 Positive Psychology** 3(3,0) Examines the research, theories, and applications of the psychology of human strengths and well-being. Fundamental research into the cultural, emotional, personality, cognitive/motivational, and developmental correlates of strengths and well-being is examined, as well as application of these principles to a variety of organizational settings. *Preq:* PSYCH 201 with a C or better and one 300-level PSYCH course, or consent of instructor.
- PSYCH 488 Theories of Psychotherapy** 3(3,0) Survey of alternative theories of psychological treatment for behavioral and emotional disorders. Various theoretical assumptions, techniques, and applications of each approach are examined and compared, and case examples are considered. *Preq:* PSYCH 370 or 383 or consent of instructor.
- PSYCH 489, 689 Selected Topics** 3(3,0) Seminar in current topics in psychology. Topics change from semester to semester and are announced prior to each semester's registration. May be repeated once for credit, but only if different topics are covered. *Preq:* PSYCH 201 with a C or better and one 300-level PSYCH course, or consent of instructor.
- PSYCH H490 Senior Division Honors Research I** 2-4(2-4,0) Preparation and defense of a research proposal. Proposed project should be empirical, historical, or theoretical in nature. *Preq:* Junior standing, consent of department chair.
- PSYCH H491 Senior Division Honors Research II** 2-4(2-4,0) Completion of the proposed research project resulting in a written thesis. *Preq:* PSYCH H490.
- PSYCH 492 Senior Laboratory in Psychology** 1(0,2) Students complete an integrative review of topics in psychology in the context of producing a reflective portfolio. *Preq:* Senior standing in Psychology.
- PSYCH 493 Practicum in Clinical Psychology** 3(1,5) Students apply classroom theory in solving individual and community problems through interaction with community agencies and other professional groups in the mental health area. Students have limited but well-controlled contact with actual clinical problems as they occur in the community environment. *Preq:* PSYCH 383 and consent of instructor.
- PSYCH 495 Practicum in Applied Psychology** 3(1,5) Students are provided practical experience in the area of applied psychology. Students usually are involved in a project designed to help solve an industrial problem through a direct application of industrial or social psychology. *Preq:* PSYCH 352 or 364 or 454; consent of instructor.
- PSYCH 496 Laboratory in Psychology** 1-3(0,2-6) Laboratory in a variety of topics in psychology, such as human factors psychology and psychological testing. May be repeated for a maximum of three credits. *Preq:* PSYCH 201 with a C or better; PSYCH 309, 310; or consent of instructor.

PSYCH 497, H497 Directed Studies in Psychology 1-4(0,2-8) Study under the direction of a faculty member of a particular topic agreed upon by the student and faculty member. May be repeated for a maximum of 12 credits. *Preq:* Six credits in psychology, a course in research methods, or consent of instructor.

PSYCH 498, H498 Team-Based Research 1-4(1-4,0) Students conduct psychological research and learn about phases of the research process with a team of their peers under the direction of a faculty member. The collaborative nature of psychological research is emphasized. May be repeated for a maximum of 18 credits. *Preq:* Consent of instructor.

READING

Professors: L. B. Gambrell, V. G. Gillis; *Associate Professors:* P. J. Dunston, S. K. Fullerton; *Assistant Professor:* J. C. McNair; *Visiting Lecturer:* M. A. McBride

READ 103 Learning Strategies 2(3,0) Students learn strategies of active learning and critical thinking skills, which become an integral part of their natural thinking processes. Students learn how to generalize and apply newly acquired strategies to a variety of settings and situations.

READ 458 Early Literacy: From Birth to Kindergarten 3(3,0) Provides Early Childhood Education majors with knowledge of theory and research-based, developmentally appropriate instructional practices related to children's literacy development within the home and school from birth to kindergarten. Factors related to assessment and communication within and between the family, school, and teacher are addressed. *Preq:* Admission to the professional level.

READ 459, H459 Teaching Reading in the Early Grades: K-3 3(3,0) Provides early childhood and Elementary Education majors an understanding of teaching reading in the elementary school setting in kindergarten through third grade. Students investigate general principles of language and literacy development and learn methods for teaching and assessing children's literacy. *Preq:* ED EC 336, ED F 301, 302; admission to the professional level. *Coreq:* ED EC 400 for Early Childhood majors.

READ 460, H460 Teaching Reading in the Elementary Grades: 2-6 3(3,0) Provides preservice teachers with an understanding of teaching reading in the elementary setting in grades 2-6. Students investigate general principles of language and literacy development and learn methods for teaching and assessing children's literacy. *Preq:* ED F 301, 302, 334; admission to the professional level.

READ 461 Content Area Reading: Grades 2-6 3(2,3) Provides preservice teachers with an understanding of teaching content area literacy in grades 2-6. Students learn methods and strategies for teaching children to learn with and make use of expository texts. Comprehension, the role of expository texts, and vocabulary learning in content areas are presented. *Preq:* READ 460, admission to the professional level. *Coreq:* ED EL 451, 487, 488 (for Elementary Education majors).

READ 462 Reading and Responding to Children's Literature in the Elementary Classroom 3(3,0) Introduces children's literature across genres. Participants examine strategies for responding to children's literature through various modes and explore cultural issues and controversies related to children's literature. *Preq:* READ 460 and admission to the professional level.

READ 463 Teaching Reading and Writing to English Language Learners 3(3,0) Within a framework of the dimensions of cross-cultural knowledge and knowledge of theories and principles related to second language acquisition, participants develop understanding of the reading and writing processes and instructional models, strategies and tools that offer supportive learning for English language learners. *Preq:* READ 460 and admission to the professional level.

READ 498, H498 Secondary Content Area Reading 3(2,2) Designed for preservice teachers who are involved with field experiences prior to student teaching full time. Prepares content area teachers to teach the reading skills necessary for effective teaching of content area material. *Preq:* Admission to professional level.

RELIGION

Professors: S. E. Grosby, N. A. Hardesty; *Lecturers:* P. A. Cohen, K. A. Wolfe

REL 101 Introduction to Religion 3(3,0) Study of the variety of religious experience and expression in human life.

REL 102, H102 World Religions 3(3,0) Survey of major religious traditions of the world.

REL 301 The Old Testament 3(3,0) Survey of the books of the Old Testament with special consideration given to the development of the concepts, institutions, and theology of the ancient Hebrews.

REL 302 Survey of New Testament Literature 3(3,0) Study of the books of the New Testament from the standpoint of their occasion, content, literary form, and basic theology.

REL 303 The Quran 3(3,0) Survey of Islamic Scripture, its origins, content, and interpretation, with attention to the development of Hadith and Sunna as well.

REL 306 Judaism 3(3,0) Examines the development of Judaism from biblical to modern times.

REL 307 The Christian Tradition 3(3,0) Examination of the development of Christianity in Western civilization from the post-New Testament period to the present, stressing institutional growth and changes, theological currents, and interaction of Christianity with culture.

REL 308 Religions of the Ancient World 3(3,0) Selected religious movements in ancient Mesopotamia, Egypt, Canaan, and the Greco-Roman world with emphasis on movements outside the Judeo-Christian tradition.

REL 310 Religion in the United States 3(3,0) Development of religion in the U.S. from the Colonial period to the 20th century. Attention is devoted to analyzing the broad currents in religious movements and religious thought that have given shape to the American pluralistic experience.

REL 311 African American Religion 3(3,0) Study of the religious milieu in the U.S. rooted in our African heritage. Background on African tribal religion is included, along with Christian denominations and new religions such as Nation of Islam, Rastafarianism, Voudun, Santeria, and Candomble.

REL 314 Buddhism in China 3(3,0) Study of Buddhism in Chinese history since the second century. Examination of the translation and interpretation of the texts, major Chinese Buddhist schools, monastic life, and the comprehensive influence of Buddhism on Chinese culture and society. All readings and discussions are in English.

REL 315 Islam 3(3,0) A study of the origins, development, and history of the religion of Islam and Islamic cultures from the time of the Prophet to the present.

REL 330 Contemporary Issues in Religion 3(3,0) Examination of a variety of issues of broad concern to scholars of religion today. Issues may vary. May be repeated for a maximum of six credits with departmental consent.

REL (PHIL) 393 Science and Religion 3(3,0) Exploration and analysis of the conceptual and historical relationship between science and religion. Examination and evaluation of the theoretical claims of science and the metaphysical claims of religion.

REL 401, 601 Studies in Biblical Literature and Religion 3(3,0) Critical examination of a selected topic in biblical studies. Topics vary from year to year. May be repeated once for credit. *Preq:* Consent of instructor.

REL 402, 602 Studies in Religion 3(3,0) Thorough examination of a selected topic in one or more of the religious traditions of the world or of religious life in a particular region. Topics vary from year to year. May be repeated once for credit. *Preq:* Consent of instructor.

REL 404, 604 History of Early Christianity 3(3,0) Study of the history, social and doctrinal, of early Christianity up to 600 A.D. *Preq:* Consent of instructor.

REL 435, 635 Religious Institutions in Community Life 3(3,0) Explores the particular significance of religious organizations as core institutions in American communities and examines their involvement with community political and social structures.

REL H497 Religion Honors Research 3(3,0) Students conduct research, clearly define the topic, and complete an annotated bibliography under the supervision of thesis advisor. *Preq:* Consent of department chair and thesis advisor.

REL H498 Religion Honors Thesis 3(3,0) In consultation with thesis advisor and departmental thesis committee, students write, revise, defend, and complete their theses. *Preq:* REL H497 and consent of department chair and thesis advisor.

REL 499, 699 Independent Study 1-3(1-3,0) Study of selected problems, issues, or movements in religion under the direction of a faculty member chosen by the student. Student and faculty member develop an individualized course of study approved by the department chair prior to registration. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

RURAL SOCIOLOGY

Assistant Professor: K. L. Robinson

R S 301 Rural Sociology 3(3,0) Study of human social relationships as influenced by life in the open country and in small towns and villages, including considerations of the rural population, rural social institutions, processes of change in agricultural technology, and community area planning and development. Offered spring semester only.

R S (SOC) 303 Methods of Social Research I 4(3,3)
See SOC 303.

R S (SOC) 371 Population and Society 3(3,0)
See SOC 371.

R S (SOC) 401, 601 Human Ecology 3(3,0) Analysis of the interrelationships between the physical world, modifications in natural environments, human settlement patterns, and institutions that both encourage and regulate environmental modification. Emphasizes conditions whereby natural resources become public policy concerns. Offered spring semester only. *Preq:* Junior standing or consent of instructor.

R S (SOC) 459, 659 The Community 3(3,0) Close analysis of the development of contemporary communities and their place in society. Continuing effects of industrialization, migration, and technological change on community location and structure are examined. Structural relations of social class, status, and the associations among institutions are explored. *Preq:* Junior standing or consent of instructor.

R S (SOC) 471, H471, 671 Demography 3(3,0)
See SOC 471.

R S (SOC) 495 Field Experience 3(1,8)
See SOC 495.

R S (SOC) 498 Independent Study 3(1,6)
See SOC 498.

RUSSIAN

Associate Professor: G. L. Love; Lecturer: J. Bridgwood

RUSS 101 Elementary Russian 4(3,1) Training in pronunciation, grammatical forms, and syntax with a view to giving the student the fundamentals necessary to hold simple conversations and to read simple Russian texts.

RUSS 102 Elementary Russian 4(3,1) Continuation of RUSS 101. *Preq:* RUSS 101.

RUSS 201, H201 Intermediate Russian 3(3,1) Brief review of RUSS 101 and 102 with conversation, composition, and dictation, and the beginning of more serious reading of Russian prose in short stories and plays. *Preq:* RUSS 102.

RUSS 202, H202 Intermediate Russian 3(3,1) Conversation, composition, and dictation based on readings of more difficult Russian prose than in the earlier courses. *Preq:* RUSS 201.

RUSS 297 Creative Inquiry—Russian 1-4(1-4,0) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Arrangements with faculty members must be established prior to registration.

RUSS 305 Russian Conversation and Composition 3(3,0) Practice in spoken Russian emphasizing vocabulary building, pronunciation, and comprehension. Written exercises promote accuracy. *Preq:* RUSS 202 or consent of department chair.

RUSS 307 Russian Civilization 3(3,0) Introduction to significant elements of Russian civilization. Emphasis is on social, geographical, political, and artistic aspects of modern Russia. Taught in Russian. *Preq:* RUSS 202 or consent of department chair.

RUSS 340 Russian Culture of the Nineteenth Century 3(3,0) Study of achievements in art, science, music, and literature in Russia during the 19th century. Taught in English.

RUSS 360 Russian Literature to 1910 3(3,0) Study of key texts in the modern literary tradition in Imperial Russia from Pushkin to Chekhov. Readings and lectures are in English.

RUSS 361 Russian Literature Since 1910 3(3,0) Study of key texts in modern Russian and Soviet literature with particular focus on Russian modernist movements and Socialist Realism. Readings and lectures are in English.

RUSS 397 Creative Inquiry—Russian 1-4(1-4,0) Students focus on a special research area under the guidance of a faculty member. After acquiring the requisite background, students formulate hypotheses for a group project, develop a critical framework, and initiate research on a specific topic.

RUSS 398 Directed Reading 1-3(1-3,0) Directed study of selected works in Russian. May be repeated for a maximum of six credits. *Preq:* RUSS 202 or equivalent and consent of department chair.

RUSS 460 Tolstoy and Dostoevsky 3(3,0) Examines a selection of major works by Leo Tolstoy and Fyodor Dostoevsky with particular focus on their literary, political, and philosophical aspects as well as their importance within the modern European literary tradition. Readings and lectures are in English. *Preq:* Junior standing or consent of instructor.

RUSS 497 Creative Inquiry—Russian 1-4(1-4,0) Continuation of research initiated in RUSS 397. Students complete their project and disseminate their research results. *Preq:* RUSS 397 or consent of instructor.

SCIENCE AND TECHNOLOGY IN SOCIETY

S T S 101 Survey of Science and Technology in Society 3(3,0) Surveys historical, philosophical, and social studies of science; introduces the basic requisites for scientific and technological literacy; and considers the problems of responsible participation in a scientifically and technologically advanced society.

S T S 102 Ideas, Machinery, and Society 3(3,0) Interdisciplinary discussion course introducing the fundamental themes of STS: the influence of social groups on the development of science and technology and the effects of science and technology on society.

S T S 171 Scientific Skepticism 3(3,0) Investigation of unusual phenomena using scientific methodology. Explores the interplay of science, pseudoscience, and society through development of critical thinking skills. Discussion-oriented course that focuses on case studies of extraordinary claims.

S T S 216 Critical Analysis of a Current STS Issue 3(3,0) Critical analysis of a current science and technology issue with significant controversial and societal consequences (e.g., global warming, methods of energy production). Students retrieve, analyze, evaluate, present, and discuss relevant information to develop basic competence in science and mathematics and in the evaluation of scientific and technological issues. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Sophomore standing.

S T S 301 Science in Context 3(3,0) Develops an understanding of the social character of scientific activity. Through the study of current work by leading historians, sociologists, and philosophers of science, students develop a comprehensive grasp of the social foundations of modern scientific inquiry.

S T S 303 Technology, Culture and Society 3(3,0) Addresses issues that arise from the interaction of technology with its social and cultural context. To better understand how technologies relate to societies and cultures, students learn to use the analytic tools required to evaluate the significance of technology, as well as its relations to social endeavors and cultural endeavors.

S T S 498, H498 Creative Inquiry 1-3(1-3,0) Students conduct research into Science and Technology in Society with a team of their peers under the direction of a faculty member. The collaborative character of research in science and technology in society is emphasized. *Preq:* May be repeated for a maximum of 12 credits.

S T S 499 Independent Study 1-3(1-3,0) Study of selected topics under direction of a faculty member selected by the student. Student and faculty member develop a course of study designed for the individual student and approved by the S T S program coordinator prior to registration. May be repeated for a maximum of six credits. *Preq:* General Education Science and Technology in Society Requirement, consent of instructor.

SECONDARY EDUCATION

Professors: B. E. Bailey, W. D. Paige; Associate Professors: R. M. Horton, L. F. Medford, C. E. Poston; Assistant Professors: S. M. Che, M. P. Cook, A. Manizade, J. C. Marshall, S. A. Mathews; Lecturer: D. V. Johnson; Clinical Faculty: W. A. Bauer, J. A. Beckett, H. L. Harrison III, J. M. McGaha

EDSEC 226 A Professional Approach to Secondary Algebra 3(3,0) Focuses on the pedagogical content knowledge needed to teach algebra effectively. It helps students master algebraic concepts, connections and representations at a deep level and solve meaningful real world problems. Students also explore the history of mathematical and algebraic thought and create meaningful and engaging lessons. *Preq:* Secondary Education major in Mathematics Teaching Area or Mathematics Teaching major.

EDSEC 324 Practicum in Secondary English 3(1,3) Pre-service secondary English teachers gain both content and pedagogical knowledge by observing and reflecting upon the classroom practices of selected in-service high school English teachers.

EDSEC 326 Practicum in Secondary Mathematics 3(1,3) Pre-service secondary mathematics teachers gain both content and pedagogical knowledge by observing and reflecting upon the classroom practices of selected in-service high school mathematics teachers.

EDSEC 327 Practicum in Secondary Science 3(1,3) Pre-service secondary science teachers gain both content and pedagogical knowledge by observing and reflecting upon the classroom practices of selected in-service high school science teachers.

EDSEC 328 Practicum in Secondary Social Studies 3(1,3) Pre-service secondary social studies teachers gain both content and pedagogical knowledge by observing and reflecting upon the classroom practices of selected in-service high school social studies teachers.

EDSEC 412 Directed Student Teaching in Secondary School Subjects 12(1,33) Program of supervised observation and teaching in cooperation with selected public schools. Opportunities are provided for prospective teachers to obtain experiences in the subject area. Students are sectioned according to teaching fields: English, social science, mathematical sciences, modern languages, science. Enrollment is limited.

EDSEC 417 Teaching Internship in the Secondary School 6(1,15) Full-time, supervised teaching internship for one semester in cooperation with a participating South Carolina secondary school. Reserved for students seeking certification in critical-need teaching areas. May be repeated for a maximum of 12 credits. To be taken Pass/Fail only. *Preq:* ED F 301, 302, 335, READ 498, and one of the following: EDSEC 424, 425, 426, 427. Application approved by the School of Education.

EDSEC 424, H424 Teaching Secondary English 3(2,2) Development of instructional practices and materials appropriate for secondary English; familiarization with curriculum materials; includes field experiences in local schools in preparation for student teaching. Taught fall semester only. *Preq:* Second semester Junior standing, admission to the professional level, ED 105, ED F 301, 302, 335, at least 18 hours of English coursework, concurrent enrollment in READ 498, minimum grade-point ratio of 2.5.

EDSEC 425 Teaching Secondary Modern Languages 3(2,2) Development of instructional practices and materials appropriate for secondary modern languages; familiarization with curriculum materials; includes field experiences in local schools. Taught fall semester only. *Preq:* Second semester Junior standing, admission to the professional level, ED 105, ED F 301, 302, 335, 18 hours of modern language coursework, concurrent enrollment in READ 498, minimum grade-point ratio of 2.5.

EDSEC 426, H426 Teaching Secondary Mathematics 3(2,2) Development of instructional practices appropriate for secondary mathematics; familiarization with curriculum materials, planning, and implementation of lessons; includes field experiences in local schools. Taught fall semester only. *Preq:* Admission to the professional level, ED 105, ED F 301, 302, 335, at least 18 hours of mathematics coursework, concurrent enrollment in READ 498, minimum grade-point ratio of 2.5.

EDSEC 427, H427 Teaching Secondary Science 3(2,2) Development of instructional practices and materials for teaching secondary school science (biological, earth, and physical sciences); familiarization with secondary science curriculum materials; includes field experiences in local schools. Taught fall semester only. *Preq:* Second semester Junior standing, admission to the professional level, ED 105, ED F 301, 302, 335, at least 18 hours of science coursework, concurrent enrollment in READ 498, minimum grade-point ratio of 2.5.

EDSEC 428, H428 Teaching Secondary Social Studies 3(2,2) Development of instructional practices and materials appropriate for secondary social studies; familiarization with curriculum materials; includes field experiences in local schools in preparation for student teaching. Taught fall semester only. *Preq:* Second semester Junior standing, admission to the professional level, ED 105, ED F 301, 302, 335, at least 18 credits of social studies coursework, concurrent enrollment in READ 498.

EDSEC 437, 637 Technology in Secondary Mathematics 3(3,0) Students learn how to integrate calculators, data collectors, and computers in the secondary mathematics curriculum. They solve problems from middle school, Algebra I, Geometry, and Algebra II courses. *Preq:* Second semester Junior standing, admission to the professional level.

EDSEC 444 Teaching Internship in Secondary English 9(0,27) Interns design, implement, and critically reflect upon instructional units and teaching practices in supervised secondary English classes. Interns must provide evidence of performance that meets national and state teaching standards for secondary English. Taught spring semester only. *Preq:* EDSEC 424. *Coreq:* EDSEC 454.

EDSEC 446 Teaching Internship in Secondary Mathematics 9(0,27) Prospective secondary mathematics teachers apply teaching and learning theories in a field-based setting through an internship in a secondary public school classroom. Taught spring semester only. *Preq:* EDSEC 426. *Coreq:* EDSEC 456.

EDSEC 447 Teaching Internship in Secondary Science 9(0,27) Supervised teaching internship in assigned secondary public school science classroom. Meets part of requirement for S.C. science teaching certification. Taught spring semester only. *Preq:* EDSEC 427. *Coreq:* EDSEC 457.

EDSEC 448 Teaching Internship in Secondary Social Studies 9(0,27) Supervised observation and teaching in cooperation with a mentor teacher in a secondary public school. Students design, implement, and critically reflect upon curricular and instructional practices in public secondary social studies classrooms. Taught spring semester only. *Preq:* EDSEC 428. *Coreq:* EDSEC 458.

EDSEC 454 Secondary English Capstone Seminar 3(2,3) Seminar in conjunction with EDSEC 444. Interns reflect upon and solve problems regarding teaching events, share effective teaching practices, and devise ways to document dimensions of effective teaching. Taught spring semester only. *Preq:* EDSEC 424. *Coreq:* EDSEC 444.

EDSEC 456 Secondary Mathematics Capstone Seminar 3(2,3) Capstone seminar accompanying supervised secondary mathematics teaching internship. Satisfies part of the requirements for South Carolina secondary certification. Taught spring semester only. *Preq:* EDSEC 426. *Coreq:* EDSEC 446.

EDSEC 457 Secondary Science Capstone Seminar 3(2,3) Capstone seminar accompanying supervised high school science teaching internship. Satisfies part of requirement for South Carolina secondary science certification. Offered spring semester only. *Preq:* EDSEC 427. *Coreq:* EDSEC 447.

EDSEC 458 Secondary Social Studies Capstone Seminar 3(2,3) Capstone seminar accompanying supervised high school social studies teaching internship. Satisfies part of requirement for S.C. secondary certification. Offered spring semester only. *Preq:* EDSEC 428. *Coreq:* EDSEC 448.

SOCIOLOGY

Professors: M. T. Britz, J. M. Coggeshall, D. K. Sturkie, *Chair*; B. J. Vander Mey, W. M. Wentworth; *Associate Professors:* E. M. Granberg, F. C. Mobley; *Assistant Professors:* M. L. Denton, W. H. Haller, Y. Luo, S. M. Nelson, M. A. Vogel, S. E. Winslow-Bowe; *Lecturers:* J. L. Holland, H. M. Kisner; *Visiting Lecturer:* S. Southworth

SOC 201, H201 Introduction to Sociology 3(3,0) Sociological perspective: the study of contemporary groups, organizations, and societies in terms of human social behavior, social change, social structure, and social institutions.

SOC 202 Social Problems 3(3,0) Social problems involving the family, education, health care, political and legal systems, economy, population, environment, community; and special problems associated with age, economics, racial status, and gender inequality.

SOC 203 Technology, Environment, and Society 3(3,0) Considers issues involved in science, technology, and the environment in relation to human behaviors and values with an emphasis on the U.S. and globalized world contexts. Surveys the sociology of environment, science, and technology. Includes selected analysis of related controversies and policy considerations.

SOC 205 Introductory Sociology Laboratory 1(0,3) Overview of major sociological fields. Examines core competencies and the Sociology major. Relevant career and academic development issues are investigated. E-portfolios are established and expanded. *Preq:* Sophomore standing, Sociology major.

SOC (C R D) 235 Introduction to Leadership 3(3,0) Introduction to leadership in various organizational settings from a sociological perspective. Examines the concept of leadership, leadership traits, types of leadership, and the evolution of leadership behaviors in the 19th and 20th centuries.

SOC (R S) 303, H303 Methods of Social Research I 4(3,3) Introduction to methods of social research: research design, sampling, measurement, reliability, and validity; the relationship between theory and research. Coordinating laboratory introduces students to computer literacy through research. Required of all Sociology majors. *Preq:* MTHSC 203 or 301 or EX ST 301, SOC 201.

- SOC 310, H310 Marriage and Intimacy 3(3,0)** Examination of mate selection, living together, marital relations, family planning, conflict resolution, divorce and remarriage, later life adjustments, and singlehood as a lifestyle in the U.S. *Preq:* SOC 201 or consent of instructor.
- SOC 311, H311 The Family 3(3,0)** Introduction to the family as a social institution. Primary focus is on families in the U.S. with comparisons to other cultures. Topics include history of the family, trends in family formation and dissolution, division of labor, intergenerational relationships, family violence, and policy. Analyses of race, class, and gender are incorporated. *Preq:* SOC 201 or consent of instructor.
- SOC 330 Work and Careers in Society 3(3,0)** Introduces changes in the structure of work from preindustrial to postindustrial periods. Topics include the effects of stratification on career decisions, career paths and implications for life changes, social effects of scientific management of work, unionization, globalization, the rise of multinational corporations, and cross-cultural comparisons of management styles. *Preq:* SOC 201 or consent of instructor.
- SOC 331 Urban Sociology 3(3,0)** Urbanization as a social process and related conditions of work, family structure, social mobility, crime, lifestyle, technology, and development of urban areas in the Third World. *Preq:* SOC 201.
- SOC 350 Self and Society 3(3,0)** Social psychology from the sociological viewpoint. Examines interactional and group influences on such individual conditions as childhood and life-course development, language, emotions, motives, sexuality, deviance, and self-concept. *Preq:* SOC 201.
- SOC 351 Collective Behavior 3(3,0)** Spontaneous, transitory, and sporadic group behavior: crowds, panics, riots, fads, and social movements. *Preq:* SOC 201.
- SOC (E L E, PO SC, PSYCH) 356 Social Science of Entrepreneurship 3(3,0)** Examines those areas of the social sciences that have direct relevance for entrepreneurs. Topics include processes by which entrepreneurs are shaped by social institutions such as the family and community, public policy implications and influences on entrepreneurship, risk perception, decision making, motivation, leadership, and group dynamics. *Preq:* SOC 201 or (C R D) 235 or PSYCH 201 or PO SC 101 or 102 or 104 or consent of instructor.
- SOC (R S) 371 Population and Society 3(3,0)** Social, economic, and political consequences of population structure and change, including problems of food and resources, as well as population goals and policies in developing countries and the United States. *Preq:* SOC 201.
- SOC 380 Introduction to Social Services 3(3,0)** Fundamentals of casework practice, including philosophy and values, models of group work, and ethics in social services work. *Preq:* SOC 201.
- SOC 388 The Criminal Justice System 3(3,0)** Social systems analysis of criminal justice agencies. Primary focus is on law enforcement and corrections and their interagency relationship with courts and prosecution. *Preq:* SOC 201.
- SOC 389 Criminology 3(3,0)** Study of nature and causes of criminal behavior; societal attempts to control crime; social responses to crime, criminals, and the criminal justice system. *Preq:* SOC 201.
- SOC 391 Sociology of Deviance 3(3,0)** Study of patterns of deviant behavior: subcultures, careers, and life-styles of deviants; deviance theory and research. *Preq:* SOC 201.
- SOC 392 Juvenile Delinquency 3(3,0)** Study of nature, extent, and causes of juvenile delinquency; societal attempts to control delinquent conduct and gang violence; emergence of the juvenile justice system. *Preq:* SOC 201.
- SOC 394, H394 Sociology of Mental Illness 3(3,0)** Mental illness as a social phenomenon, including cultural and social influence, organizational settings of mental health-care delivery, legal issues, patient-therapist relationships, and mental illness intervention as social control. *Preq:* SOC 201.
- SOC 396 Alcoholism: Social Causes, Consequences and Treatment 3(3,0)** Issues involved in alcoholism and alcohol abuse, assessment of sociological and social-psychological theories of alcoholism and prevention; societal problems associated with the misuse of alcohol. *Preq:* SOC 201 or consent of instructor.
- SOC 397 Drug Abuse: Social Causes, Consequences and Treatment 3(3,0)** Issues involved in drug abuse other than alcohol; assessment of sociological and social-psychological theories of drug use, abuse, and treatment; societal problems associated with the misuse of drugs other than alcohol. *Preq:* SOC 201 or consent of instructor.
- SOC 398 Computer Crime 3(3,0)** Traces the history of technological crime and evaluates forensic practices in light of legislation with an analysis of emerging case law. Addresses guidelines for the development of forensic laboratories, the creation of computer crime task forces, search/seizure of electronic equipment, and the evaluation of criminal subcultures.
- SOC (R S) 401, 601 Human Ecology 3(3,0)** See R S 401.
- SOC 404, 604 Sociological Theory 3(3,0)** Survey of the development of sociological theory. Required of all Sociology majors. *Preq:* SOC 201 and Junior standing or consent of instructor.
- SOC H408 Honors Thesis Research I 3** Reading and research related to senior honors thesis. Completion of junior honors requirements and approval of department chair and thesis advisor required. *Preq:* SOC H303, H310, honors status.
- SOC H409 Honors Thesis Research II 3** Research and writing related to the senior honors thesis. SOC H408, honors status.
- SOC 414, 614 Policy and Social Change 3(3,0)** Uses the sociological perspective to examine policy development, implementation, and evaluation in the public and private sectors. Specifically, focuses on values and ethics and effects of social change efforts on the outcomes of policy formation, social planning, and implementation. *Preq:* SOC 201 and Junior standing or consent of instructor.
- SOC 430 Sociology of Organizations 3(3,0)** Analysis of administrative organizations and voluntary associations; applied analysis of their formal and informal group relations, communications, and effectiveness. *Preq:* SOC 201 and Junior standing or consent of instructor.
- SOC 432 Sociology of Religion 3(3,0)** Sociological analysis of religious systems and movements and their influence on other social institutions. *Preq:* SOC 201 and Junior standing or consent of instructor.
- SOC 433, 633 Globalization and Social Change 3(3,0)** Examination of the social and historical causes of development and underdevelopment. Various sociological theories of development are reviewed. Selected countries are examined in an international context. *Preq:* SOC 201 and Junior standing or consent of instructor.
- SOC 435, 635 Leadership and Team Building 3(2,3)** Introduction to the area of leadership and the process of building effective teams. Examines various sociological perspectives on leadership and their role in developing and maintaining various types of groups. Students are actively involved in the educational process through participation in experiential learning opportunities. *Preq:* SOC 201 and Junior standing or consent of instructor.
- SOC 444 Sociology of Education 3(3,0)** Examines the relationship between education and society. Topics include theoretical perspectives, school organization, social mobility and stratification in schools, race and gender, tracking and school reform. *Preq:* SOC 201.
- SOC (R S) 459, 659 The Community 3(3,0)** See R S 459.
- SOC 460, 660 Race, Ethnicity, and Class 3(3,0)** Investigation of sociological perspectives on race, ethnic relations, and social stratification. Includes analysis of the impact of social class on minority movements. *Preq:* SOC 201 and Junior standing or consent of instructor.
- SOC 461, H461 Sex Roles 3(3,0)** Female and male socialization; changes in statuses, roles, inequality, and opportunities in contemporary society, with cross-cultural and social class comparisons. *Preq:* SOC 201 and Junior standing or consent of instructor.
- SOC 462 Men, Masculinity, and Society 3(3,0)** Consideration of masculinity and social order: norms, roles, relationships, and activities; identity and socialization: work, family, sexuality, war, sports, including subcultural comparisons. *Preq:* SOC 201 and Junior standing or consent of instructor.
- SOC 463, 663 Sociology of Parenting 3(3,0)** Study of sociology of parenting, child rearing, parenting styles and outcomes; social change and parenting; variations by sex, race, and class. Includes cross-cultural comparisons. Course is research-based with an applied orientation. *Preq:* SOC 201, Junior standing.
- SOC 468 Sociology of Criminal Evidence 3(3,0)** Introduction to the types of evidence, collection of evidence, chain of custody, and procedures relating to the introduction of evidence into judicial proceedings. Attention is given to Fourth Amendment constitutional issues, the development of law within American boundaries, and the cross-cultural development of law.
- SOC (R S) 471, H471, 671 Demography 3(3,0)** Study of demographic concepts, theory, and research methods for vital statistics, migration, and population distribution and projections. Considers collection and processing of demographic data and organization of demographic data systems. Offered fall semester only. *Preq:* ANTH 201 or SOC 201 or R S 301.

SOC 480, 680 Medical Sociology 3(3,0) Study of sociocultural factors in the etiology and treatment of physical illness, medical occupations and professions, and the organization of health care delivery systems. *Preq:* SOC 201 and Junior standing or consent of instructor.

SOC 481, 681 Aging and Death 3(3,0) Sociological orientation to aging populations focusing on the impact of health care, welfare, and retirement systems. Includes dying as a social phenomenon, suicide, euthanasia, and funerals. *Preq:* SOC 201 and Junior standing or consent of instructor.

SOC 484, 684 Child Abuse and Treatment 3(3,0) Comprehensive examination of child abuse, neglect, and exploitation as major social problems; causes, effects, and prevalence of physical, sexual, and emotional maltreatment; definitional controversies; social policy and legal considerations; therapeutic approaches for children and their caretakers; child maltreatment and the judicial system. *Preq:* SOC 201 and Senior standing or consent of instructor.

SOC 486 Creative Inquiry—Sociology 1-3(1-3,0) Investigates topics and engages in action research projects selected by faculty and students. Goals, research, activities, and outcomes vary from semester to semester and project to project. May be repeated for a maximum of 12 credits. *Preq:* SOC 201.

SOC 491 The Sociology of Policing 3(3,0) Introduction to the major issues of contemporary policing in the U. S. from a sociological perspective. Topics include the changing functions and structure of policing, the police subculture, and the role of the police in a liberal democracy. *Preq:* SOC 390 or consent of instructor.

SOC 493, 693 Sociology of Corrections 3(3,0) Analysis of correctional alternatives. Topics include sentencing strategies and their impact, prison populations (male, female, and juvenile), inmate social structures, treatment and custody issues, community-based alternatives (probation, parole, electronic monitoring, and work release), and correctional management issues. *Preq:* SOC 390 or consent of instructor.

SOC 494, 694 Sociology of Organized Crimes 3(3,0) Examines the multifarious aspects of criminal organizations, namely their structure, methods, and networks. Specific topics may include white-collar crime and traditional, nontraditional, and transnational organized crime. *Preq:* SOC 201 or consent of instructor.

SOC (R S) 495 Field Experience 3(1,8) Students participate in selected field placements under supervision for eight hours weekly and in a one-hour seminar per week. May be repeated once for credit. *Preq:* SOC 380 or 390 and consent of department chair.

SOC 497 Sociology Senior Laboratory 1(0,3) Concludes overview of theory, research, methodology, and fields of sociology. Students add to and finalize complete portfolio, and prepare for post-degree careers and major field test. *Preq:* SOC 205 with a passing grade, Senior standing, 2.0 cumulative grade-point ratio.

SOC (R S) 498 Independent Study 3(1,6) Individual readings or projects in sociological areas not covered in other courses. A written proposal must be approved by the instructor directing the work and by the department chair prior to registration. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.

SOC 499 Seminar in Selected Topics in Contemporary Sociology 3(3,0) Sociological areas of current interest are explored. May be repeated by special arrangement for a maximum of six credits. *Preq:* Consent of department chair.

SOILS AND SUSTAINABLE CROP SYSTEMS

Professors: P. H. Adler, R. G. Bellinger, E. P. Benson, J. D. Culin, W. M. Hood, H. T. Knap, S. B. Martin, J. C. Morse, V. L. Quisenberry, M. B. Riley, S. W. Scott, E. R. Shipe, P. A. Zungoli, *Interim Chair; Associate Professor:* W. C. Stringer; *Assistant Professors:* P. Agudelo, Y. Arai, J. Kerrigan, N. Tharayil, M. W. Turnbull; *Lecturer:* B. E. Edge

SSCS 101 Survey of Soils and Sustainable Crop Systems 1(1,0) Introduces majors to Soils and Sustainable Crop Systems concentrations, career paths, faculty, and University resources. *Preq:* Soils and Sustainable Crop Systems major or consent of instructor.

SSCS 102 Academic and Professional Development I 1(1,0) Introduces Soils and Sustainable Crop Systems majors to University library services, evaluates computer program proficiency and begins development of portfolio. Web-based portfolio showcases skills and experiences (e.g. *résumés*, accomplishments, and work samples) during undergraduate program. Time management and ethical decision making are discussed.

SSCS 333 Agricultural Genetics 3(3,0) Broad study of genetics as it applies to agricultural species and interacting organisms: weeds, pests, pathogens, beneficial organisms. Topics include genetic centers of origin, mutations and chromosomes in species domestication, transmission genetics and reproduction, genetics of qualitative and quantitative traits, genetics of development, and stress responses, agricultural omics. *Preq:* BIOL 104/106, 111, or consent of instructor.

SSCS 335 Agricultural Biotechnology 3(2,2) Strategies for the best use of biotechnology and genetic resources to alleviate constraints in global hunger, environmental sustainability, and health. Includes genetic enhancement and chromosome engineering of plant, animal, and microbial systems; issues related to commercial implementation; the impact on developing countries, environmental impact, and governmental policies. *Preq:* GEN 301 or consent of instructor.

SSCS 401 Academic and Professional Development II 1(1,0) Soils and Sustainable Crop Systems majors evaluate, critique, and update portfolios for presentation to future employers. Students work with Career Center and instructor to develop interviewing skills and *résumés*, access professional goals, and identify skills necessary for reaching goals to be competitive. The importance of ethics in soils and sustainable crop systems careers is discussed.

SSCS 445, 645 Regulatory Issues and Policies 1(1,0) Introduction to regulations of agricultural practices and implementation of novel technologies and products. Emphasizes patenting biotechnology inventions and ethical issues. Includes survey of state and governmental agencies with responsibilities to avoid risk to humans, non-target organisms, and preservation of food safety, agricultural resources, and natural ecosystems.

SSCS 450, 650 Agricultural Biosystems and Risk Assessment 1(1,0) In-depth discussion of recent articles on agricultural biotechnology and related issues. Independent and comprehensive literature survey and critical discussions on introduction of modified organisms into biological systems, agricultural adoption, and bio-risk assessment. Discussions relate to scientific discovery, application, and regulatory issues of agricultural biotechnology.

SSCS 451, 651 Agricultural Biotechnology and Global Society 1(1,0) In-depth discussion of recent articles on agricultural biotechnology and related global issues. Includes independent and comprehensive literature survey and critical discussions on implementation of biotechnology products in the context of world agricultural production systems and economics. Discusses the role of international agencies and social and ethical issues.

SSCS (ENT) 496 Selected Topics in Creative Inquiry 1-2(1-2,0) Disciplinary and multidisciplinary projects with the goal of developing the student's ability to discover, analyze, evaluate, and present data. Students are required to document their activities in their ePortfolios. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

SSCS (ENT) 497 Selected Topics in Creative Inquiry Laboratory 1-2(0,3-6) Disciplinary and multidisciplinary research project with the goal of developing the student's ability to conduct research along with analysis, evaluation and presentation of results. Students are required to document their research activities in their ePortfolios. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

SPANISH

Professors: C. R. Adams, P. R. Heusinkveld, M. A. Morris; *Associate Professors:* J. K. Hurley, M. M. Rojas-Massei, G. E. Tissera; *Assistant Professors:* L. Dykstra, D. J. Smith; *Lecturers:* B. Del Villar, D. Diaz, X. Gonzalez-Parada, M. Greene, S. K. Harris, L. M. Hernandez, H. Montes, C. A. Robison, R. K. Simpson, S. Tyson, S. Watt, R. G. Unda, M. Zamora

SPAN 101 Elementary Spanish 4(3,1) Course for students with no previous experience in Spanish study. The fundamentals of grammar and vocabulary are taught, and a foundation is provided for building oral and written proficiency. Three hours a week of classroom instruction and one hour a week in the language laboratory.

SPAN 102 Elementary Spanish 4(3,1) Continuation of SPAN 101.

SPAN 104 Basic Spanish 4(3,1) Condensed first-year course for students who have previously studied Spanish. Upon completion, students are prepared to enter Intermediate Spanish.

- SPAN 151 Spanish for Graduate Students 3(3,0)** Intensive program only for graduate students preparing for the reading examination in Spanish. A minimum grade of B on a final examination will satisfy graduate school foreign language requirement. May be repeated once. To be taken Pass/Fail only. *Preq:* Graduate standing.
- SPAN 201, H201 Intermediate Spanish 3(3,1)** Intermediate course to practice listening, speaking, reading, and writing. Grammatical structures and basic vocabulary are reviewed systematically. Includes literary and cultural perspectives. *Preq:* SPAN 102, 121, or consent of department chair.
- SPAN 202, H202 Intermediate Spanish 3(3,1)** Continuation of SPAN 201. *Preq:* SPAN 201.
- SPAN 221 Accelerated Spanish II 6(6,0)** Accelerated intermediate course that may be taken in lieu of SPAN 201 and 202. Through conversation, composition, dictation, and intensive grammar review, proficiency is stressed. Includes literary readings and cultural perspectives. May not be taken by students who have completed SPAN 201 or 202. *Preq:* SPAN 102, 121, or consent of department chair.
- SPAN 297 Creative Inquiry—Spanish 1-4(1-4,0)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Arrangements with faculty members must be established prior to registration.
- SPAN 302 Intermediate Spanish Grammar and Composition 3(3,0)** Intensive review of Spanish structure, verbs, idioms, and vocabulary with an introduction to syntax and stylistics through controlled and free composition. *Preq:* SPAN 202 or consent of department chair.
- SPAN 304 Introduction to Hispanic Literary Forms 3(3,0)** Introduction to the basic structures and elements of fiction, poetry, drama, and essay, including literary and critical theory, with readings in 19th and 20th-century Spanish and Spanish-American literature. *Preq:* SPAN 302 or 305.
- SPAN 305 Intermediate Spanish Conversation and Composition I 3(3,0)** Practice in spoken Spanish with emphasis on vocabulary, pronunciation, intonation, and comprehension. Includes written work to increase accuracy and assignments in the language laboratory. *Preq:* SPAN 202 or consent of department chair.
- SPAN 306 Spanish Composition for Business 3(3,0)** Intensive practice of business writing skills through compositions, general review of grammatical structures, and exposure to business vocabulary and concepts. *Preq:* SPAN 202 or consent of department chair.
- SPAN 307 The Hispanic World: Spain 3(3,0)** Introduction to the significant aspects of the culture of Spain from its origins to the present. Emphasizes the artistic, social, historical, political, and contemporary issues of the Iberian Peninsula. *Preq:* SPAN 202 or consent of department chair.
- SPAN 308 The Hispanic World: Latin America 3(3,0)** Introduction to the significant aspects of the culture of Spanish-American countries. Emphasis is placed on the development of the political, economical, geographical, social, and artistic aspects of Spanish America from the indigenous period to the present. *Preq:* SPAN 202 or consent of department chair.
- SPAN 309 Introduction to Spanish Phonetics 3(3,0)** Study of basic concepts of phonetics and phonology, fundamental principles of Spanish pronunciation and International Phonetic Alphabet. *Preq:* SPAN 202 or consent of department chair.
- SPAN 310 CLIP Summer Immersion Program 6(6,0)** Conducted entirely in Spanish for eight hours daily. Consists of activities that combine interrelating cultural topics with language skill practice. Frequent opportunities to converse with native speakers during meals and on excursions. Students receive six credits, three of which may be taken in lieu of SPAN 202. *Preq:* SPAN 201.
- SPAN 311 Survey of Spanish-American Literature 3(3,0)** Literary movements, influences, authors, and works from the Colonial period to the present. *Preq:* Six credits in Spanish at the 300 level, including at least one course in literature or culture.
- SPAN 313 Survey of Spanish Literature I 3(3,0)** Literary movements, influences, and authors from the beginning to the end of the 17th century; representative works, discussions. *Preq:* Six credits in Spanish at the 300 level, including three credits of literature or culture.
- SPAN 314 Hispanic Linguistics 3(3,0)** Familiarizes students with the theory and practice of linguistics applied to Spanish, in order to deepen their knowledge of phonetics, morphology, syntax, semantics and linguistic change. *Preq:* SPAN 302 or consent of department chair.
- SPAN 316 Spanish for International Trade I 3(3,0)** Introduction to commercial Spanish; study of the spoken and written language, protocol, and cultural environment of the Spanish-speaking business world. Business vocabulary, basic business and cultural concepts, and situational practice. Grammatical review through business letters, professional documents and commercial reports. Reading and analysis of commercial texts. *Preq:* Two 300-level Spanish language, literature, or culture courses; or consent of instructor.
- SPAN 318 Spanish Through Culture 3(3,0)** Topic-generated conversation course in Spanish through a broad array of artistic manifestations in the Hispanic World emphasizing conversation and short written exercises. Focuses on one Hispanic culture topic which provides a basis for class discussion and short written compositions in Spanish. *Preq:* One 300-level course in Spanish.
- SPAN (PO SC) 382 Spanish-Language News 1(1,0)** See PO SC 382.
- SPAN H391 Honors Introduction to Hispanic Literary Forms 1(1,0)** One-hour independent study to allow honors students to pursue supervised research on some aspect of Hispanic literature. *Coreq:* SPAN 301, membership in Calhoun Honors College.
- SPAN H392 Survey of Spanish Literature 1(1,0)** Independent study allowing honors students to pursue supervised research on witchcraft in 15th and 16th-century Spain. *Coreq:* SPAN 313, membership in Calhoun Honors College.
- SPAN H393 The Hispanic World: Latin America 1(1,0)** One-hour independent study to allow honors students to pursue supervised research on a topic related to Hispanic American history, politics, geography, economics, social institutions, or artistic movements. *Coreq:* SPAN 308, membership in Calhoun Honors College.
- SPAN 397 Creative Inquiry—Spanish 1-4(1-4,0)** Students focus on a special research area under the guidance of a faculty member. After acquiring the requisite background, students formulate hypotheses for a group project, develop a critical framework, and initiate research on a specific topic.
- SPAN 398 Directed Reading 1-3(1-3,0)** Directed study of selected topics in Spanish literature, language, and culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.
- SPAN 401 New Spanish Fiction 3(3,0)** Study of selected readings by popular emerging and established authors of Spain, with emphasis on current cultural trends. Readings include, but are not limited to, detective novels, regional fiction, and fiction from marginalized groups in Spain. *Preq:* SPAN 300-level literature course or consent of department chair.
- SPAN 403 Spanish American Women Writers 3(3,0)** In-depth study of selected literary works by Spanish American women. Representative authors are studied within their philosophical and socio-political contexts. *Preq:* Spanish 300-level literature course or consent of department chair.
- SPAN 404 Nineteenth and Twentieth Century Spanish Literature 3(3,0)** Selected readings from major authors in Spain. Emphasis is on readings in poetry, theatre, short story, and novels from the 19th to the early 20th century. *Preq:* Spanish 300-level literature course or consent of department chair.
- SPAN 405 International Trade, Film, and Literature 3(3,0)** Readings and films on the social, economic, and political changes of the Hispanic world. *Preq:* Spanish 300-level literature or culture course or consent of department chair.
- SPAN 406 Hispanic Narrative Fiction 3(3,0)** Topic-generated readings from Spanish America and/or Spain. Readings consider gender issues, the family, ethnicity, religion, politics, history, or socioeconomic issues in the Hispanic world. *Preq:* Spanish 300-level literature or culture course or consent of department chair.
- SPAN 407 Hispanic Film 3(3,0)** Films are "read" as texts that mirror Hispanic society. Besides learning about cinematographic techniques in Spanish, topics include comparative analysis of film and literature, film as propaganda, film as "blockbuster," and the cinematic depiction of social, cultural, and historical realities of Hispanic nations. *Preq:* Spanish 300-level language, literature, or culture course or consent of department chair.
- SPAN 409 Comprehensive Writing in Spanish 3(3,0)** Study of stylistics in addition to grammar review; writing paragraphs, short compositions, and creative papers in Spanish on both fiction and non-fiction topics. *Preq:* Any 300-level Spanish course or consent of department chair.
- SPAN 411 Advanced Spanish Conversation and Composition 3(3,0)** Continuation of SPAN 305 with emphasis on greater fluency and sophistication in oral and written expression. *Preq:* SPAN 305 or consent of department chair.
- SPAN 415 Spanish for Health Professionals 3(3,0)** Medical concepts and terminology in Spanish; designed for students who plan to work in professions related to public health care. *Preq:* Six credits in Spanish at the 300-400 level.

SPAN 416 Spanish for International Trade II 3(3,0) Study of more complex business vocabulary, cultural concepts, and environment of Hispanic markets. Social, political, and economic issues related to Spanish-speaking countries and their current economies in global marketing. Economic geography of Hispanic countries, company organization, management, banking, investment, goods and services, and marketing. *Preq:* SPAN 316.

SPAN 417 Professional Communication 3(3,0) Skill-oriented course, taught in a seminar format. Students learn established "protocol" for addressing various Spanish-speaking audiences and learn to give professional presentations in Spanish. *Preq:* Spanish 300-level course or consent of department chair.

SPAN 418 Technical Spanish for Health Management Professionals 3(3,0) Technical health communication course in Spanish with emphasis on managerial and business aspects of the international health industry. *Preq:* SPAN 415 and six additional credits in Spanish at the 300-400 level.

SPAN 419 Health and the Hispanic Community 3(3,0) Study of cultural aspects of health and health services in Hispanic populations. Taught in Spanish. *Preq:* SPAN 415 and six additional credits in Spanish at the 300-400 level.

SPAN 420 Hispanic Drama 3(3,0) Exploration of contemporary Hispanic theatre. The production and reception of the plays are analyzed paying particular attention to notions of dramatic genre. Focuses on the change and continuity of the plays as well as their historical, cultural, and ideological backgrounds. *Preq:* Two 300-level Spanish literature or culture classes.

SPAN 421 Spanish-American Modernism and Postmodernism 3(3,0) In-depth study of Spanish-American modernism and postmodernism with focus on narrative and poetry. *Preq:* Any 300-level Spanish literature course or consent of department chair.

SPAN 422 The Contemporary Spanish-American Novel 3(3,0) New trends in the development of the Spanish-American novel from the 1940s to the present. *Preq:* Spanish 300-level literature course or consent of department chair.

SPAN 423 Advanced Topics in Hispanic Linguistics 3(3,0) Continuation of SPAN 314 with advanced topics. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* SPAN 314.

SPAN 435 Contemporary Hispanic Culture 3(3,0) Study of social, political, economic, and artistic manifestations of contemporary Hispanic culture. *Preq:* Spanish 300-level civilization or culture course or consent of department chair.

SPAN H438 Spanish Honors Research 3(3,0) Individual honors research conducted under the direction of Language Department faculty. May not be used to satisfy requirements for the major in Modern Languages-Spanish or Language and International Trade or the minor in Modern Languages. *Preq:* Junior standing, membership in Calhoun Honors College.

SPAN H439 Spanish Honors Thesis 3(3,0) Individual honors research conducted and thesis completed under the direction of Language Department faculty. May not be used to satisfy requirements for the major in Modern Languages-Spanish or Language and International Trade or the minor in Modern Languages. *Preq:* Junior standing, SPAN H438, membership in Calhoun Honors College.

SPAN H491 Hispanic Narrative Fiction 1(1,0) One-hour independent study to allow honors students to pursue supervised research on the socio-political climate under Franco's dictatorship, with emphasis on contemporary literary theory. *Coreq:* SPAN 406, membership in Calhoun Honors College.

SPAN H492 Contemporary Latin American Novel 1(1,0) One-hour independent study to allow honors students to pursue supervised research in the literary and cinematographic images of magic realism. *Coreq:* SPAN 422, membership in Calhoun Honors College.

SPAN 497 Creative Inquiry—Spanish 1-4(1-4,0) Continuation of research initiated in SPAN 397. Students complete their project and disseminate their research results. *Preq:* SPAN 397 or consent of instructor.

SPAN 498 Independent Study 1-3(1-3,0-3) Directed study of selected topics in Spanish language, literature, and culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.

SPAN 499, 699 Special Topics 3(3,0) Study of timely or special topics in Spanish. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of department chair.

SPECIAL EDUCATION

Professors: V. I. Correa, A. Katsiyannis, P. M. Stecker; *Associate Professor:* M. J. Hodge, P. J. Riccomini; *Assistant Professors:* K. A. McDuffie, J. B. Ryan; *Clinical Faculty:* R. E. Fish

ED SP 370, H370 Introduction to Special Education 3(3,0) Survey of students with disabilities and with gifts/talents. Individuals with Disabilities Education Act is emphasized, including general educator's role in serving students with special needs. Characteristics, assessment, and effective instructional procedures for students of varying exceptionalities are addressed. *Preq:* Minimum grade-point ratio of 2.0.

ED SP 371 Characteristics of the Mildly Handicapped 3(3,0) Surveys the characteristics which distinguish the mildly/moderately handicapped from the more severely handicapped. *Preq:* Minimum 2.0 grade-point ratio.

ED SP 372 Characteristics and Instruction of Individuals with Learning Disabilities 3(3,0) In-depth coverage of characteristics and identification procedures for individuals with learning disabilities. Effective instructional strategies are addressed. Students participate in field experience throughout the semester. Offered fall semester only. *Preq:* ED SP 370; admission to professional level.

ED SP 373 Characteristics and Instruction of Individuals with Mental Retardation 3(3,0) In-depth coverage of characteristics and identification procedures for individuals with mental retardation. Effective instructional strategies are addressed. Students participate in field experiences throughout the semester. *Preq:* ED SP 370; admission to professional level.

ED SP 374 Characteristics and Strategies for Individuals with Emotional/Behavioral Disorders 3(3,0) In-depth coverage of characteristics and identification procedures for individuals with emotional or behavioral disorders. Effective instructional strategies and behavior management are addressed. Students participate in field experiences throughout the semester. *Preq:* ED SP 370; admission to professional level.

ED SP 468 Early Intervention for Infants and Children with Special Needs 3(3,0) Provides students with a working knowledge of the history of early intervention, legal precedence for providing early intervention services, and effective instructional techniques for working with infants and young children with disabilities and their families. *Preq:* ED SP 370.

ED SP 469, 669 Characteristics of Individuals with Emotional and Behavioral Disorders 3(3,0) Addresses the characteristics of individuals with emotional and behavioral disorders. Consideration is given to historical and legal aspects, definitions, comprehensive assessment, and the impact of school, home, culture, and society on individuals with behavior disorders. Research findings in the field of behavior disorders are emphasized. *Preq:* ED SP 370.

ED SP 470, 670 Characteristics of Individuals with Learning Disabilities 3(3,0) Provides specific knowledge of definitions, evaluation procedures, cognitive, social, academic, and functional skills of individuals with learning disabilities across the lifespan. *Preq:* ED SP 370.

ED SP 472, 672 Characteristics of Individuals with Mental Retardation 3(3,0) Characteristics of mental retardation across the lifespan: learning, behavioral, and developmental aspects are examined. *Preq:* ED SP 370.

ED SP 473, 673 Educational Procedures for Individuals with Mental Retardation 3(3,0) Identification, selection, and preparation of functional curriculum materials and pedagogy for teaching students with mental retardation. A multidisciplinary, student-centered approach to program planning provides the framework. *Preq:* ED SP 472.

ED SP 474, 674 Procedures for Individuals with Emotional and Behavioral Disorders 3(3,0) Assists students in developing specific strategies for teaching individuals with emotional and behavioral disorders, utilizing preventive measures, expanding skills in behavior analysis, and implementing the least restrictive intervention warranted. Includes programmatic considerations, social skill instruction, curriculum selection, IEP development, and effective transition. *Preq:* ED SP 469.

ED SP 475, 675 Educational Procedures for Individuals with Learning Disabilities 3(3,0) Provides knowledge of educational evaluation and instructional procedures to improve outcomes for individuals with learning disabilities. *Preq:* ED SP 470 or consent of instructor.

ED SP 476, 676 Practicum in Learning Disabilities 3(2,3) Addresses content knowledge, skills, and professional values for successful teaching of students with learning disabilities. Focuses on teacher-directed instruction and the use of critical instructional factors, the use of recommended practices for individuals with learning disabilities, and the measurement and analysis of student performance data. *Preq:* ED SP 470, 475; completion of student teaching.

ED SP 478, 678 Practicum in Emotional and Behavioral Disorders 3(2,3) Addresses content knowledge, performance skills, and professional values for successful teaching of students with emotional and behavioral disorders. Focuses on teacher-directed instruction and the use of critical instructional factors, the use of recommended practice for students with disabilities, and the measurement and analysis of student performance data. *Preq:* ED SP 474; completion of student teaching.

ED SP 479, 679 Practicum in Mental Retardation 3(2,3) Addresses content knowledge, performance skills, and professional values for successful teaching of students with mental retardation. Focuses on teacher-directed instruction and the use of critical instructional factors, the use of recommended practices for students with disabilities, and the measurement and analysis of student performance data. *Preq:* ED SP 473; completion of student teaching.

ED SP 491 Educational Assessment of Individuals with Disabilities 3(2,2) Introduction to assessment process (verification) in special education. Includes procedural safeguards; data collections via informal and standardized procedures; issues in assessment; psychometric properties of standardized tests; and administration, scoring, and interpretation of selected instruments. Offered spring semester only. *Preq:* ED SP 372, 373.

ED SP 492 Mathematics Instruction for Individuals with Mild Disabilities 3(3,0) Prepares students to provide explicit instruction in mathematics for individuals with mild disabilities. Students learn to assess, analyze and teach math skills systematically. Offered fall semester only. *Preq:* ED SP 374, 491; concurrent enrollment in ED SP 493, 494, 496, 497.

ED SP 493 Classroom and Behavior Management for Special Educators 3(3,0) Students describe various intervention strategies for increasing and maintaining appropriate behaviors and for decreasing or eliminating inappropriate behaviors. Students accurately recognize, record, and chart inappropriate behaviors; employ the least restrictive intervention; foster self-management skills; and develop preventive strategies and classwide systems for managing academic and social behavior. Offered fall semester only. *Preq:* ED SP 374, 491; concurrent enrollment in ED SP 492, 494, 496, 497.

ED SP 494 Teaching Reading to Students with Mild Disabilities 3(3,0) Emphasizes the knowledge and skills necessary for teaching reading to students with mild disabilities. Offered fall semester only. *Preq:* ED SP 374, 491; concurrent enrollment in ED SP 492, 493, 496, 497.

ED SP 495 Written Communication and Collaboration for the Resource Teacher 3(3,0) Focuses on the development of written communication skills to enhance special education teachers' collaboration with parents, regular educators, public and private agencies. Offered spring semester only. *Preq:* ED SP 492, 493, 494, 496; concurrent enrollment in ED SP 416 or 498.

ED SP 496 Special Education Field Experience 3(0,9) Supervised practical experience prior to Directed Teaching for preservice special education teachers preparing to teach individuals with mild/moderate disabilities. Offered fall semester only. *Preq:* ED SP 374, 491; concurrent enrollment in ED SP 492, 493, 494, 497.

ED SP 497 Secondary Methods for Individuals with Disabilities 3(3,0) Preparation for working with students with mild/moderate disabilities in secondary schools. Focus is on literature, methods, and materials for providing instruction in transition, self-determination, knowledge within content areas, functional skills, and integration into the community. Offered fall semester only. *Preq:* ED SP 374, 491; concurrent enrollment in ED SP 492, 493, 494, 496.

ED SP 498 Directed Teaching in Special Education 12(1,33) Comprehensive course providing a full-time, semester-long experience for preservice special education teachers who plan to teach individuals with mild/moderate disabilities. Generally the last course in the program; provides teaching experience under the supervision of University and school personnel. Offered spring semester only. *Preq:* ED SP 492, 493, 494, 496, 497; concurrent enrollment in ED SP 495.

TEXTILES

Professors: J. M. Ballato, D. A. Brosnan, M. S. Ellison, S. H. Foulger, G. C. Lickfield, I. A. Luzinov, H. J. Rack, K. A. Richardson, *Director*; *Associate Professors:* P. J. Brown, K. Kornev, J. Luo; *Assistant Professors:* V. Blouin, M. Kennedy, T. Mefford

TEXT 175 Introduction to Textile Manufacturing 3(3,0) Introduction to the broad fields of textile, fiber, and polymer science and engineering with emphasis on the scientific, technological, and business principles utilized in producing fibers, yarns, and fabrics; enhancing fabric functionality by dyeing, finishing, and printing; and establishing end-use products.

TEXT 176 Natural and Man-Made Fibers 4(3,3) Introduces the concept of natural and synthetic polymers as the raw materials of the textile industry. Survey of the origin, characteristics, and processing properties of various natural fibers and fiber-forming synthetic polymers. Formation of textile fibers from polymeric materials is presented with specific emphasis on the polymer science and engineering principles.

TEXT 201 Yarn Structures and Formation 4(3,3) Study of fiber processing systems required to transform various fibrous materials into yarn. Involves the machine principles and theories, relationship of the fibers to the process and the resultant yarn structures, and subsequent analysis of the yarn structure to define quality and to determine suitable manufacturing practices. *Preq:* TEXT 175 and 176 or consent of instructor.

TEXT 202 Fabric Structures, Design, and Analysis 4(3,3) Study of fabric formation techniques designed to explore the principles and theories of modern technology. Evaluation and analysis of weaving, knitting, and nonwoven fabrication of textile structures. *Preq:* TEXT 201 or consent of instructor.

TEXT 314 Chemical Processing of Textiles 4(3,2) Presents concepts of current procedures in chemical, mechanical, and physical preparation and in bleaching, dyeing, printing, and finishing of fabrics; emphasizes colorimetric and spectrophotometric methods of color control and test methods for the evaluation of the effectiveness of the treatments. Not open to Polymer and Fiber Chemistry or Textile Management (Chemical) majors.

TEXT 333 The Textile Arts 3(2,3) Surveys development of the hand loom from prehistoric times to the present. Studio work in the elements of handwoven fabrics, their design, analysis, and production of four-harness counterbalance and jack looms. *Preq:* Junior standing or consent of instructor.

TEXT 416 Nonwoven Structures 3(2,2) Nonwoven fabric structures, their manufacture, properties, and applications. Methods of nonwoven fabric formation, resultant material characteristics and end-use applications are examined. *Preq:* TEXT 201.

TEXT 421, H421 Fiber Science 3(2,2) Familiarizes students with the physical properties of textile and high performance fibers and how these properties influence process and end-use performance; method of measuring those properties; and how those properties are related to structural features of the fiber.

TEXT 422, 622 Properties of Textile Structures 3(2,2) Yarn and fabric properties, their scientific significance and analysis. Dimensional, structural, and mechanical interrelationships are established and evaluated.

TEXT 445, 645 Special Topics in Textile, Fiber, and Polymer Science 1-3(1-3,0) Special topics in textile, fiber, and polymer sciences. A co-enrollment course for similar courses in other departments such as for those students involved in CAEFF projects and CH E 445. There may be different sections in a term to cover different topics. May be repeated for a maximum of nine credits, but only if different topics are covered. *Preq:* Consent of instructor.

TEXT 460, 660 Textile Processes 3(3,0) Survey of machinery and processes of textile manufacturing from fiber formation through fabric finishing. For students with a nontextile background.

TEXT 472, 672 Textile International Trade 3(3,0) Analyzes the current structure of the international textile trade including imports, exports, tariffs, and trade requirements. Field experience with local firms is used to enhance students' understanding. *Preq:* Senior standing or consent of instructor.

THEATRE

Professors: M. J. Charney, D. J. Hartmann; *Assistant Professors:* K. L. Johnson, A. M. Penna; *Lecturers:* C. Collins, K. W. Moore, S. Robert, P. E. Savas

THEA 195 Creative Inquiry—Theatre 1-4(1-4,0)
In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

THEA 210, H210 Theatre Appreciation 3(3,0)
Examination of the theatre event approached through historical context, play reading, analysis of production practices, and field trips to live dramatic performances.

THEA 267 Stage Makeup Techniques 3(2,1) Practical study of basic stage makeup techniques for the acting student including corrective makeup, modeling with paint, three-dimensional makeup, prostheses with latex, and makeup for other media.

THEA 277 Production Studies in Theatre 3(3,0)
Study of technical production and design including scenery, costume, and lighting through the examination of plays in production.

THEA 278 Acting I 3(2,3) Fundamentals of acting; basic stage techniques; exercises in interpretation, improvisation, characterization; experience in supervised scene study.

THEA 279 Theatre Practicum 1(0,3) Practical work in theatre on a production designed for public presentation. May be repeated for a maximum of four credits.

THEA 288 Introduction to Computer-Aided Drafting 3(2,3) Introduction to the basics of computer-aided drafting. Software applications include AutoCAD, Vectorworks, and WYSWYG.

THEA 295 Creative Inquiry—Theatre 1-4(1-4,0)
In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

THEA (MUSIC) 308 Broadway Vocal Tradition I 3(3,0) See MUSIC 308.

THEA (MUSIC) 309 Broadway Vocal Tradition II 3(3,0) See MUSIC 309.

THEA 315 Theatre History I 3(3,0) Historical survey of Western theatre. Emphasis is placed on the changing roles of the playwright, director, actor, technician, and spectator from antiquity to the Renaissance. *Preq:* Sophomore standing.

THEA 316 Theatre History II 3(3,0) Historical survey of Western theatre. Emphasis is placed on the changing roles of the playwright, director, actor, technician, and spectator from the Renaissance to the present. *Preq:* Sophomore standing.

THEA 317 African-American Theatre I 3(3,0) Acquaints students with the origin and development of African-American playwrights, plays, players, and their contributions to the American theatre from the 19th century to the Civil Rights Movement.

THEA 318 African-American Theatre II 3(3,0)
Acquaints students with the development of African-American playwrights, plays, players, and their contributions to the American theatre from the Black Arts Movement to the present.

THEA (ENGL) 347 The Structure of Drama 3(3,0)
Introduction to the creative writing and critical study of drama. *Preq:* ENGL 310 or consent of instructor.

THEA 367 Costume Technology 3(2,3) Theory and practice of costume technology including equipment, patterning, fabric identification, cutting, construction, and fitting.

THEA 368 Voice for the Stage 3(2,3) Study of the principles of vocal production and standard American speech for the stage; exercises in breath support and projection, improving tonal quality, and elimination of regional dialects through the study of the International Phonetic Alphabet. *Preq:* Sophomore standing.

THEA 372 Creative Drama 3(3,0) Practical applications using creative drama as a learning tool to strengthen curriculum goals and heighten student participation in the classroom. Students develop classroom teaching strategies based on drama education. Appropriate for elementary and secondary teachers, artists, and workshop leaders.

THEA 374 Stage Movement for Actors 3(1,2) Study of the psychological and physical sources of movement in the human body, with emphasis on the attainment of intellectual and physical control and the application of the skills to the development of a role.

THEA 376 Stage Directing I 3(2,3) Directing and staging techniques for the proscenium stage; exercises in composition, movement, picturization; experience in direction of scenes. *Preq:* Sophomore standing.

THEA 377 Stagecraft 3(2,3) Theory and practice of stage design and technology. *Preq:* Sophomore standing.

THEA 379 Acting Ensemble 1(0,3) Performance opportunities in the area of theatre for young audiences. Students are members of a theatrical touring troupe and perform in a variety of spaces and locations. May be repeated for a maximum of four credits. By audition only.

THEA 388 Stage Management 3(3,0) Examines the vital part stage managers play in every theatrical production including organizing rehearsals, facilitating communication between director and designers, and calling cues during performances. Introduces the art and craft of stage management by incorporating Performing Arts Department and Brooks Center productions.

THEA 395 Creative Inquiry—Theatre 1-4(1-4,0)
In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

THEA 398 Special Topics in Theatre 3(3,0) Select areas of study in theatre not addressed by other theatre course offerings. May be repeated once. *Preq:* Consent of instructor.

THEA (ENGL) 430, 630 Dramatic Literature II 3(3,0) See ENGL 430.

THEA (ENGL) 447, 647 Playwriting Workshop 3(0,3) Workshop in the creative writing of plays. May be repeated once. *Preq:* THEA (ENGL) 347 or consent of instructor.

THEA 467 Costume Design 3(3,0) Theory and practice of costume design for the theatre including the study of production concept and styles, sketching, and rendering. *Preq:* THEA 367 or consent of instructor.

THEA 472, 672 Improvisation: Interpreting and Developing Texts 3(3,0) Practical applications using drama as a learning tool to strengthen writing skills, motivate collaboration, heighten analytical skills. Students use improvisation to analyze texts and to revise original work, consider theory and research of contemporary scholars, and develop approaches to literature and composition based on readings and drama experiences. *Preq:* Senior standing or consent of instructor.

THEA 476 Stage Directing II 3(2,3) Continued study in the art of stage directing emphasizing leading contemporary theory and methodology. Culminates in the production of a one-act play for public presentation. *Preq:* THEA 376 or consent of instructor.

THEA 477 Stage Design 3(2,3) Study and practice in stage design, including drafting, graphics, drawing, rendering, scene painting, and light plotting. *Preq:* THEA 377 or consent of instructor.

THEA 479 Acting II 3(2,3) Continued study in the craft of acting for contemporary Western theatre. Students focus on monologue and scene study in a variety of performance settings. *Preq:* THEA 375 and consent of instructor.

THEA 480 Advanced Scene Study for Actors 3(2,3)
Students interpret and perform characters in complex plays written in heightened styles and integrating period movement into the various genres and styles of plays throughout major periods of theatre history. Styles include Elizabethan, Comedy of Manners, Farce, Chekhov Realism, Absurdism, Mamet, and various contemporary approaches. *Preq:* THEA 479 or consent of instructor.

THEA 487, 687 Stage Lighting I 3(2,1) Theory and practice of stage lighting through an understanding of various lighting instruments, lighting control systems, and execution of lighting designs.

THEA 488 Stage Lighting II 3(2,3) Study of advanced stage lighting theories and practices including script analysis, technology, software and execution of lighting designs. Other topics include unions and contracts, shop orders, and assisting the lighting designer. *Preq:* THEA 487 or consent of instructor.

THEA 495 Creative Inquiry—Theatre 1-4(1-4,0)
In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

THEA 497, 697 Scene Painting 3(2,1) Practical study of basic painting techniques for the theatre including layout, proper use of materials, painting styles, and texturing techniques.

THEA 499, 699 Independent Studies 1-3 (1-3,0) Tutorial work for students with special interests outside the scope of existing courses. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.

WILDLIFE AND FISHERIES BIOLOGY

Professors: W. W. Bowerman, W. H. Conner, J. W. Foltz, D. C. Guynn, J. J. Isely, R. J. Johnson, J. D. Lanham, P. A. Layton, *Chair*; V. B. Shelburne, G. K. Yarrow; *Associate Professors:* W. R. English, P. G. Jodice, A. R. Johnson; *Assistant Professors:* R. F. Baldwin, B. L. Brown, E. Mikhailova; *Instructors:* C. J. Cummings, J. R. Davis

W F B 101 Introduction to Wildlife and Fisheries Biology 1(1,0) Informative sketch of aquaculture, fisheries science, and wildlife management. Introduces principles, resources, professional organizations, and careers in these fields. Offered fall semester only. *Preq:* Wildlife and Fisheries Biology major or consent of instructor.

W F B 102 Methods of Wildlife and Fisheries Biology 1(0,2) Introduction to methodology used in aquaculture, fisheries science, and wildlife management. Students are introduced to terminology, techniques, laws, and legislations. Skills with dimensions, units, computations, and technical communications as applied to aquaculture, fisheries, and wildlife. *Preq:* Wildlife and Fisheries Biology major. *Coreq:* W F B 101.

W F B 300 Wildlife Biology 3(3,0) Natural history, biology, and conservation of wildlife managed by natural resource agencies. Attention is given to those factors important in the management and conservation including species distribution and abundance, habitat requirements, and life-history characteristics. Principles and problems associated with conservation of selected wildlife species are covered. *Preq:* Two semesters of introductory biology.

W F B 301 Wildlife Biology Laboratory 1(0,3) Identification of wildlife species with emphasis on game and non-game wildlife species managed or protected by state and federal agencies. One or more required weekend field trips will be scheduled. *Preq:* Wildlife and Fisheries Biology major. *Coreq:* W F B 300.

W F B 306 Introduction to Wildlife Conservation 2(2,0) Examines the fundamental thinking upon which modern conservation programs have been built.

W F B 307 Hunting and Wildlife Management 1(1,0) Hunting techniques used to harvest renewable wildlife resources are examined with respect to their roles in sound management practices. The effects of selected hunting regulations on wild populations, safety, and ethics are discussed. *Preq:* Junior standing or consent of instructor.

W F B (BIOSC) 313 Conservation Biology 3(3,0) Study of the biological bases for the conservation of flora, fauna, and habitats. Biological factors that influence the decision-making process are also addressed. *Preq:* One year of general biology or consent of instructor.

W F B 350 Principles of Fish and Wildlife Biology 3(3,0) Introduction to principles of fisheries and wildlife biology on which sound management practices are based. Interrelationships of vertebrate and invertebrate biology, habitat, and population dynamics are covered. *Preq:* One year of general biology.

W F B 410, 610 Wildlife Management Techniques 3(1,6) Covers field and laboratory methods commonly used in wildlife management and research. Students interact with wildlife professionals. Topics include research methodology, estimating wildlife population characteristics, condition measures, and food habits; species determination, sex, and age; capture; population monitoring methods; GIS and mapping techniques, habitat evaluation and improvement. *Preq:* W F B 300 and 350.

W F B 412, H412, 612 Wildlife Management 3(2,3) Basic principles and general practices of wildlife management and conservation are covered. Major problems concerning the management of wildlife resources, with emphasis on upland game species. Laboratory work includes practical work on the Clemson University woodlands and field trips to several areas where wildlife management is being practiced. *Preq:* W F B 300 and 350.

W F B 414, 614 Wildlife Nutritional Ecology 3(3,0) Concepts of how terrestrial wildlife obtains and utilizes energy and nutrients in wild ecosystems are taught. Energy and nutrient availability are discussed in the ecological context of distribution, flow, and cycling in natural and modified foraging areas. Physiology of digestion is discussed for major homeotherms. *Preq:* W F B 300 and 350.

W F B 416, 616 Fishery Biology 3(2,3) Principles underlying freshwater fish production. Introduction to major groups of freshwater fishes and their habitats. Topics include identification, age and growth, fecundity, food habits, populations estimation, environmental evaluation, management practices, and fish culture. *Preq:* W F B 300 and 350.

W F B 418 Fishery Conservation 3(3,0) Survey of conservation efforts directed toward freshwater and marine fisheries resources. Topics include threatened, endangered, and over-exploited species and introductions of exotic species. *Preq:* W F B 300 and 350.

W F B 430, 630 Wildlife Conservation Policy 3(3,0) Deals with the ecological rationale and management implications of public policy designed for the conservation of American wildlife resources. Emphasis is on managed-land issues. *Preq:* W F B 300 and 350.

W F B 440 Non-Game Wildlife Management 3(3,0) Basic principles and general practices of non-game wildlife management are covered. Emphasis is placed on those principles and practices most appropriately used by state agencies in their management programs for non-game species, along with real-world problems associated with implementation of such programs. *Preq:* W F B 300 and 350.

W F B 444, 644 Wildlife Damage Management 3(2,3) Covers the philosophical, sociological, ecological, and economical basis for controlling damage caused by animals problem wildlife populations. Emphasis is placed on fundamentals of prevention and control of damage caused by vertebrate species, especially mammals and birds. Includes interaction with federal and state agencies and private consultants. *Preq:* W F B 300 and 350.

W F B 445 Urban Wildlife Management 3(3,0) Focuses primarily on social, scientific, and ecological aspects of managing wildlife in the urban setting. Basic wildlife management techniques as well as urban planning for wildlife are covered. *Preq:* W F B 300 and 350.

W F B 450, 650 Aquaculture 3(3,0) Basic aquacultural techniques applied to freshwater and marine organisms; past and present culture of finfishes and shellfishes around the world; principles underlying fish production; water quality, feeding, and nutrition as they influence production of cultured aquatic organisms. *Preq:* W F B 300 and 350.

W F B 460, 660 Warmwater Fish Diseases 2(2,0) Study of diseases in warmwater fish including infectious and noninfectious processes. *Preq:* W F B 300 and 350.

W F B 462, H462, 662 Wetland Wildlife Biology 3(3,0) Study of wetland wildlife habitats, emphasizing classification by physical, chemical, and biological characteristics; importance of wetland habitat for management and production of wetland wildlife species. Offered fall semester only. *Preq:* W F B 300 and 350.

W F B 463 Directed Research in Aquaculture, Fisheries, and Wildlife Biology 1(0,3) Research problems in selected areas of aquacultural, fisheries, or wildlife science to introduce students to experimental design, research techniques, and presentation of research results. May be repeated for a maximum of three credits. *Preq:* Junior standing, consent of instructor.

W F B (BIOSC, ENT) 469, H469, 669 Aquatic Insects 3(1,6) See ENT 469.

W F B (AP EC) 475, 675 Economics of Wildlife Management and Policy 3(3,0) See AP EC 475.

W F B 476, 676 Field Methods in Avian Monitoring and Conservation 3(1,4) Field-intensive introduction to the identification, ecology, and conservation of North American birds and their habitats with an emphasis on southeastern species. Includes avian survey and census techniques. Two or three weekend (Friday-Sunday) field trips are required. *Preq:* BIOL 104/106, 111 or consent of instructor.

W F B 493 Selected Topics I-4(0-4,0-12) Specialized topics which explore current areas of research and management in aquaculture, fisheries science, or wildlife management are examined in lecture-seminar format. May be repeated for a maximum of ten credits, but only if different topics are covered. *Preq:* Junior standing, consent of instructor.

W F B 498 Senior Portfolio 1(1,0) Collection of Web-based materials representing the creative and scientific papers, presentations, and resumes written by students to satisfy curriculum requirements. Students are regularly informed regarding the format and content of their portfolios. *Preq:* Senior standing in Wildlife and Fisheries Biology. *Coreq:* F N R 499.

WOMEN'S STUDIES

Professor: J. M. Melton; *Associate Professor:* E. K. Sparks;
Assistant Professor: M. Shockley; *Lecturer:* S. Watts

W S 103 Women in Global Perspective 3(3,0)

Cross-cultural and multidisciplinary introduction to issues facing women globally. Issues may include women and work, violence against women, reproduction and women's health, sexuality and rites of passage, women and the weight of tradition, movements for women's empowerment.

W S 301 Introduction to Women's Studies:

Women's Lives 3(3,0) Interdisciplinary course exploring the unique features of women's lives from childhood to old age. Content is based on new research in many disciplines, including psychology, sociology, history, literature, and the arts. *Prq:* Sophomore standing.

W S (COMM) 316 Girlhood, Media, and Popular

Culture 3(3,0) See COMM 316.

W S (PHIL) 349 Theories of Gender and Sexuality

3(3,0) See PHIL 349.

W S 390 Women's Studies Internship 3(1,8)

Faculty-supervised internship provides Women's Studies minors with relevant work experience, mentoring, and networking opportunities with local leaders in business, government, and non-profit organizations. *Prq:* Women's Studies minor, Junior standing, and consent of internship coordinator.

W S (ANTH) 423 Women in the Developing World

3(3,0) See ANTH 423.

W S (ENGL) 436 Feminist Literary Criticism 3(3,0)

See ENGL 436.

W S 459, 659 Selected Topics in Women's Studies

1-3(1-3,0) Topics change from semester to semester and are announced prior to registration. May be repeated for a maximum of six credits, but only if different topics are covered.

W S 498 Advanced Studies in Women's Studies

3(3,0) Focuses on the theoretical foundations for women's studies, with particular emphasis on how women's studies research and theory influence institutions and governmental policies. Readings include essays on such central women's studies issues as work, family, children, health care, legislation, and government policies. *Prq:* W S 301 or consent of instructor.

FACULTY

- Abbott, Albert G.,** *Coker Chair and Professor, Genetics, Biochemistry and Life Science Studies.* BS, University of Connecticut, 1976; PhD, Brown University, 1980
- Abercrombie, John G.,** *Lecturer, Biological Sciences.* BS, Furman University, 1995; MS, Clemson University, 2001
- Abernathy, Larry W.,** *Visiting Assistant Professor, Leadership, Counselor Education, Human and Organizational Development.* BA, 1969, MA, 1973, Clemson University
- Adams, Clementina R.,** *Professor, Languages.* BA, University of Atlántico (Colombia), 1969; MS, 1974, PhD, 1984, Florida State University
- Adams, Tim O.,** *Adjunct Assistant Professor, Forestry and Natural Resources.* BS, 1977, MS, 1979, North Carolina State University; PhD, Clemson University, 1992
- Adams, Warren P.,** *Professor, Mathematical Sciences.* BS, Lewis University, 1979; MS, 1981, PhD, 1984, Virginia Tech
- Adelberg, Jeffrey W.,** *Associate Professor, Environmental Horticulture.* BS, 1982, MS, 1987, Rutgers University; PhD, Clemson University, 1993
- Adler, Peter H.,** *Professor, Entomology, Soils, and Plant Sciences.* BS, Washington and Lee University, 1976; MS, 1979, PhD, 1983, Pennsylvania State University
- Agudelo, Paula,** *Assistant Professor, Entomology, Soils, and Plant Sciences.* BS, National University of Colombia (Colombia), 1996; MSc, University of Cakdas (Colombia), 2000; PhD, University of Arkansas, 2004
- Alapati, Satish B.,** *Adjunct Assistant Professor, Bioengineering.* BDS, Kuempu University (India), 1996; MS, 2003, PhD, 2006, Ohio State University
- Alexander, John C., Jr.,** *Breazeale Professor of Financial Planning, School of Accountancy and Finance.* BBA, 1984, MBA, 1985, Stetson University; PhD, Florida State University, 1991
- Alexander, Kim E.,** *Director of Center for Safety Research and Education.* MS, 1988, MEd, 1992, EdD, 2006, Clemson University
- Alexis, Frank,** *Assistant Professor, Bioengineering.* BSc, 1999, MSc, 2000, University of Montpellier II (France); PhD, Nanyang Technological University (Singapore), 2006
- Alexov, Emil Georgiev,** *Associate Professor, Physics and Astronomy.* MS, 1984, PhD, 1990, Sofia University (Bulgaria)
- Allard, Cora M.,** *Lecturer, Biological Sciences.* BS, Millikin University, 2000; MS, University of Kentucky, 2003
- Allen, Craig R.,** *Adjunct Associate Professor, Forestry and Natural Resources, and Biological Sciences.* BS, University of Wisconsin, 1989; MS, Texas Tech University, 1993; PhD, University of Florida, 1997
- Allen, Dennis M.,** *Adjunct Professor, Forestry and Natural Resources.* BS, Hobart College, 1972; MS, 1974, PhD, 1978, Lehigh University
- Allen, Jeffery S.,** *Adjunct Assistant Professor, Forestry and Natural Resources.* BS, Michigan State University, 1983; MS, University of South Carolina, 1986
- Allen, Lawrence R.,** *Dean, College of Health, Education, and Human Development; Professor, Parks, Recreation, and Tourism Management.* BS, West Chester State University, 1970; MS, 1974, PhD, 1979, University of Maryland
- Alley, Pamela R.,** *Senior Lecturer, Psychology.* BA, 1975, MA, 1978, PhD, 1983, University of Connecticut
- Alley, Thomas R.,** *Professor, Psychology.* BA, 1975, BS, 1975, Pennsylvania State University; MA, 1979, PhD, 1981, University of Connecticut
- Allison, David J.,** *Professor, School of Architecture.* BS, 1978, MArch, 1982, Clemson University
- Allred, Sherri Terese,** *Lecturer, English.* BA, University of North Carolina-Charlotte, 1991; MA, Clemson University, 2007
- Altstatt, Hamilton S.,** *Assistant Professor, Performing Arts.* BS, Drexel University, 1983
- Amerson, Roxanne,** *Instructor, School of Nursing.* BS, Regents College, 1995; MSN, Clarkson College, 1999; PhD, Clemson University, 2009
- Amirkhanian, Serji N.,** *Mays Professor of Transportation, Civil Engineering.* BS, 1979, MS, 1981, Tennessee Technological University; PhD, Clemson University, 1987
- An, Yanming,** *Professor, Languages.* BA, 1982, MA, 1985, Fudan University (China); PhD, University of Michigan, 1997
- An, Yuehui,** *Adjunct Associate Professor, Bioengineering.* MD, Harbin Medical University (China), 1983; MM, Beijing Medical University (China), 1986
- Anderson, Daniel Morgan,** *Lecturer, Parks, Recreation, and Tourism Management.* BS, Western Illinois University, 1997; MPRTM, Clemson University, 2009
- Anderson, David P.,** *Adjunct Professor, Chemical and Biomolecular Engineering.* BA, Clemson University, 1973; MS, 1977, PhD, 1981, University of Massachusetts
- Anderson, Denise Marie,** *Associate Professor, Parks, Recreation, and Tourism Management.* BA, Illinois Wesleyan University, 1992; MS, Eastern Illinois University, 1993; PhD, University of Illinois, 2000
- Anderson, Matthew,** *Adjunct Lecturer, Performing Arts.* BA, Northwestern University, 1985
- Anderson, Paul Christopher,** *Associate Professor, History.* BA, University of North Carolina, 1990; MA, 1994, PhD, 1998, University of Mississippi
- Andrae, John G.,** *Associate Professor, Entomology, Soils, and Plant Sciences.* BS, Texas A&M University, 1993; MS, Oklahoma State University, 1995; PhD, University of Idaho, 2000
- Andrew, John R., Jr.,** *Professor, History.* BA, University of North Carolina, 1987; MA, Clemson University, 1993; PhD, University of Georgia, 1997
- Andrus, Ronald D.,** *Associate Professor, Civil Engineering.* BS, 1983, MS, 1986, Brigham Young University; PhD, University of Texas, 1994
- Anker, Jeffrey Nathan,** *Assistant Professor, Chemistry.* BS, Yale University, 1998; PhD, University of Michigan, 2005
- Anneaux, Bruce L.,** *Adjunct Assistant Professor, Bioengineering.* BS, Medical University of South Carolina, 1995; MS, 2000, PhD, 2006, Clemson University
- Appling, Jeffrey R.,** *Associate Dean for Curriculum, Undergraduate Studies; Associate Professor, Chemistry.* BS, 1980, PhD, 1985, Georgia Institute of Technology
- Arai, Yuji,** *Assistant Professor, Entomology, Soils, and Plant Sciences.* BS, University of California-Davis, 1996; PhD, University of Delaware, 2002
- Argraves, William Scott,** *Adjunct Professor, Bioengineering.* BS, 1978, PhD, 1985, University of Connecticut
- Armstrong, James B.,** *Adjunct Professor, Forestry and Natural Resources.* BS, Freed-Hardeman College, 1976; MS, Abilene Christian University, 1978; PhD, Virginia Tech, 1989
- Arthur-Banning, Skye Gerald,** *Assistant Professor, Parks, Recreation, and Tourism Management.* BS, Brock University (Canada), 1997; MS, Oregon State University, 1999; PhD, University of Utah, 2005
- Arya, Dev Priva,** *Associate Professor, Chemistry.* BS, University of Delhi (India), 1996; PhD, Northeastern University, 1996
- Ashley-Ross, Miriam Adele,** *Adjunct Associate Professor, Biological Sciences.* BS, Northern Arizona University, 1988; PhD, University of California-Irvine, 1994
- Ashton, Susanna M.,** *Associate Professor, English.* BA, Vassar College, 1989; MA, 1993, PhD, 1998, University of Iowa
- Askew, George R.,** *Director, Belle W. Baruch Institute of Coastal Ecology and Forest Science; Professor, Forestry and Natural Resources.* BS, 1976, MS, 1978, PhD, 1981, Clemson University
- Atamturktur, Hurive Sezer,** *Assistant Professor, Civil Engineering.* BS, Middle East Technical University (Turkey), 2002; MS, 2006, PhD, 2009, Pennsylvania State University
- Aultman, Linda S.,** *Adjunct Assistant Professor, Civil Engineering.* BS, 2000, MS, 2002, Clemson University
- Awalew, Beshawired,** *Assistant Professor, Mechanical Engineering.* BS, Addis Ababa University (Ethiopia), 1997; MS, 2000, PhD, 2005, Pennsylvania State University
- Azi, Nadim M.,** *Department Chair and Professor, Civil Engineering.* BSCE, 1978, MS, 1980, PhD, 1984, University of Mississippi
- Babu, Sabarish Venkat,** *Assistant Professor, School of Computing.* BS, 2000, MS, 2002, PhD, 2007, University of North Carolina-Charlotte
- Backman, Kenneth F.,** *Associate Professor, Parks, Recreation, and Tourism Management.* BS, Acadia University (Canada), 1980; MUP, 1985, PhD, 1989, Texas A&M University
- Backman, Sheila J.,** *Professor, Parks, Recreation, and Tourism Management.* BSC, 1977, MR, 1979, Acadia University (Canada); PhD, Texas A&M University, 1988
- Baicu, Catalin F.,** *Adjunct Assistant Professor, Bioengineering.* MS, Polytechnic University of Bucharest (Romania), 1987; PhD, Clemson University, 1996
- Baier, Scott L.,** *Associate Professor, Economics.* BS, 1988, MA, 1991, Bowling Green State University, PhD, Michigan State University, 1996
- Bailey, Beatrice Naff,** *Professor, Teacher Education.* BA, Longwood College, 1978; MA, Bethany Theological Seminary, 1981; EdD, Virginia Tech, 1987
- Bain, Lisa J.,** *Associate Professor, Biological Sciences.* BS, University of Georgia, 1992, PhD, North Carolina State University, 1997
- Baird, William V.,** *Adjunct Professor, Biological Sciences, Adjunct Professor, Environmental Horticulture.* BS, Oregon State University, 1976; MA, Miami University, 1979; PhD, University of Virginia, 1983
- Baker, Thomas L.,** *Associate Professor, Marketing.* BBA, 1984, MPA, 1986, University of Kentucky; PhD, Florida State University, 1990
- Balakrishnan, Nagraj,** *Associate Dean, College of Business and Behavioral Science; Professor, Management.* BE, University of Madras (India), 1981, MS, University of Kentucky, 1983, PhD, Purdue University, 1987
- Baldwin, Anna Oakley,** *Lecturer, Teacher Education.* BA, Winthrop University, 1987, MEd, Clemson University, 1989
- Baldwin, Elizabeth Dennis,** *Assistant Professor, Parks, Recreation, and Tourism Management.* BA, Hollins College, 1989; MEd, Miami University, 1992; PhD, University of Maine, 2006
- Baldwin, Robert Fritz,** *Assistant Professor, Forestry and Natural Resources.* AB, Colby College, 1985; MS, George Mason University, 1992; PhD, University of Maine, 2005
- Baldwin, William S.,** *Associate Professor, Biological Sciences.* BS, Central Michigan University, 1989; PhD, North Carolina State University, 1995
- Ballato, John M.,** *Professor, Materials Science and Engineering.* BS, 1993, MS, 1995, PhD, 1997, Rutgers University
- Banks, Scott A.,** *Adjunct Assistant Professor, Bioengineering.* BS, 1985, MS, 1988, Case Western Reserve University, PhD, Massachusetts Institute of Technology, 1992
- Bannister, Hazen,** *Adjunct Lecturer, Performing Arts.*
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- Barattoni, Luca,** *Assistant Professor, Languages.* BA, University of Bologna (Italy), 1996; MA, University of North Carolina, 2001
- Barcelona, Robert James, Jr.,** *Assistant Professor, Parks, Recreation, and Tourism Management.* BA, University of Mississippi, 1993; MS, 1995, PhD, 2001, Indiana University
- Barczewski, Stephanie L.,** *Professor, History.* BA, Columbia University, 1990; PhD, Yale University, 1996
- Barefoot, Susan F.,** *Chief Operating Officer, Agriculture Experiment Station; Associate Dean and Program Director, Food Safety and Nutrition; Professor, Food Science and Human Nutrition.* BS, 1971, MS, 1979, PhD, 1985, North Carolina State University
- Barfield, Rayford E., Jr.,** *Professor, English.* AB, La Grange College, 1961; MA, University of Georgia, 1963; PhD, University of Tennessee, 1969
- Barker, James F.,** *President of Clemson University, Professor, School of Architecture.* BArch, Clemson University, 1970; MArch, Washington University, 1973; FAIA
- Barmore, Charles R.,** *Adjunct Professor, Food Science and Human Nutrition.* BS, Clemson University, 1966; MS, 1969, PhD, 1972, University of Florida
- Barnes, Edward M.,** *Adjunct Assistant Professor, Biosystems Engineering.* BS, 1988, MS, 1990, North Carolina State University; PhD, Oklahoma State University, 1996
- Barnes, Peter A.,** *Department Chair and Professor, Physics and Astronomy.* BA, 1963, MS, 1964, PhD, 1969, University of Waterloo (Canada)
- Barrett, David E.,** *Alumni Distinguished Professor, Teacher Education.* BA, Wesleyan University, 1969; MS, 1973, PhD, 1974, University of Southern California
- Barron, Felix H.,** *Professor, Food Science and Human Nutrition.* BS, University of Chihuahua (Mexico), 1972; MS, Sapienza University of Rome (Italy), 1975; MS, Washington State University, 1982; PhD, Michigan State University, 1990
- Barth, Jeremy L.,** *Adjunct Assistant Professor, Bioengineering.* BS, Clemson University, 1987; PhD, University of Georgia, 1996
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- King, Samuel C., PhD, Professor Emeritus of Languages
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- Kingsland, Graydon Chapman, Sr., PhD, Professor Emeritus of Plant Pathology and Physiology
- Kissam, John Benjamin, PhD, Professor Emeritus of Entomology
- Klein, Richard Harold, PhD, Professor Emeritus of Finance
- Kline, Ellis Lee, PhD, Professor Emeritus of Microbiology and Molecular Medicine
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- Lambert, Robert Stansbury, PhD, Professor Emeritus of History
- Lander, Ernest McPherson, Jr., PhD, Alumni Professor Emeritus of History
- Lane, Carl Leaton, PhD, Professor Emeritus of Forestry
- Lane, Samuel, County Extension Agent Emeritus
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- Laskar, Renu C., PhD, Professor Emerita of Mathematical Sciences
- Lathrop, Jay Wallace, PhD, Professor Emeritus of Computer Engineering
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- Law, E. Harry, PhD, Professor Emeritus of Mechanical Engineering
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- Lee, Daniel Dixon, Jr., PhD, Professor Emeritus of Animal and Veterinary Sciences
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- Lee, Peter Roald, MArch, Alumni Distinguished Professor Emeritus of Architecture
- Lefort, Henry Gerard, PhD, Professor Emeritus of Ceramic Engineering
- Leigh, Herbert D., III, PhD, Professor Emeritus of Materials Science and Engineering
- Leonard, Michael S., PhD, Professor Emeritus of Industrial Engineering
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- Lewis, Stephen A., PhD, Professor Emeritus of Entomology, Soils, and Plant Sciences
- Ligon, James Teddie, PhD, Professor Emeritus of Agricultural and Biological Engineering
- Lindsay, Cotton M., PhD, Professor Emeritus of Economics
- Ling, Robert Francis, PhD, Professor Emeritus of Mathematical Sciences
- Linville, Dale Edward, PhD, Professor Emeritus of Agriculture and Bioengineering
- Locke, Ernest Lyle, County Extension Agent Emeritus
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- Loyd, Max Ira, PhD, Professor Emeritus of Agricultural and Applied Economics
- Lukawicki, Stanley Michael, PhD, Professor Emeritus of Mathematical Sciences
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- McCorkle, Linda Harris, BS, County Extension Agent Emerita
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- Spalding, Robert Emmet, Jr., MS, Extension Associate Emeritus
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- Spitzer, John C., PhD, Professor Emeritus of Animal and Veterinary Sciences
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- Stewart, Harry Eugene, PhD, Professor Emeritus of French
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- Stockham, James Allen, MFA, Professor Emeritus of Art
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- Strickland, Deborah Riley, County Extension Agent Emerita
- Sturgis, Eugenie Ventre, MS, Professor Emerita of Mathematical Sciences
- Stutzenberger, Fred John, PhD, Professor Emeritus of Biological Sciences
- Sudduth, Terry Q., MS, Assistant Director of Extension Emeritus
- Suggs, Henry Lewis, PhD, Professor Emeritus of History
- Sullivan, Michael Jack, PhD, Professor Emeritus of Entomology, Soils, and Plant Sciences
- Sullivan, Sophia Elizabeth, MS, Librarian Emerita
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- Testin, Robert Francis, PhD, Chair and Professor Emeritus of Packaging Science; Professor Emeritus of Biosystems Engineering
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- Vaughn, Edward A., PhD, Professor Emeritus of Materials Science and Engineering
- Vergano, Peter J., PhD, Professor Emeritus of Packaging Science
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- Walker, John Henry, PhD, Professor Emeritus of Educational Foundations
- Walker, Nancy Hilton, PhD, Professor Emerita of Entomology, Soils, and Plant Sciences
- Walker, Walter Saxon, MEd, Professor Emeritus of Poultry Science
- Wallace, Myles Stuart, PhD, Professor Emeritus of Economics
- Wallenius, Kenneth Ted, PhD, Professor Emeritus of Mathematical Sciences
- Waller, Robert Alfred, PhD, Dean Emeritus, College of Liberal Arts; Professor Emeritus of History
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- Wheeler, Richard Ferman, PhD, Head and Professor Emeritus of Animal Science
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- White, Mervin Forrest, PhD, Professor Emeritus of Sociology
- White, Richard Kenneth, PhD, Newman Professor Emeritus of Natural Resources Engineering in Agricultural and Biological Engineering and Environmental Engineering and Science
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- Whitmire, Jerry Morris, MA, Professor Emeritus of Spanish
- Wiggins, Emily Sutherland, EdD, Professor Emerita of Home Economics
- Wiley, Edward Parker, PhD, Professor Emeritus of English
- Williams, Frankie K., PhD, Associate Professor Emeritus of Leadership, Counselor Education, and Human Organizational Development
- Williams, Gloristine Fowler, County Extension Agent Emerita
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- Williams, Patricia Miller, Interim County Extension Director Emerita
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- Williams, Woodie Prentiss, Jr., PhD, Professor Emeritus of Food Science
- Williamson, Robert Elmore, PhD, Professor Emeritus of Agricultural and Biological Engineering
- Willingham, Russell, MA, Professor Emeritus of Languages
- Willis, Samuel Marsh, PhD, Professor Emeritus of Industrial Management
- Wilson, Martha Craft, County Extension Agent Emerita
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- Winchell, Donna H., PhD, Professor Emerita of English
- Witcher, Wesley, PhD, Professor Emeritus of Plant Pathology and Physiology
- Witherspoon, Gayland Brooks, MArch, Associate Dean Emeritus, College of Architecture; Professor Emeritus of Architecture
- Withington, Marian Hull, MS, Librarian Emerita
- Wixson, Bobby Guinn, PhD, Dean Emeritus, College of Sciences; Professor Emeritus of Biological Sciences
- Wolak, Francis J., PhD, Professor Emeritus of Agricultural and Biological Engineering
- Wood, Gene W., Professor Emeritus, Forestry and Natural Resources
- Wood, Julia Taylor, MS, Professor Emerita of Home Economics
- Wood, Wallace Blackwell, Jr., Distinguished County Agent Emeritus
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- Woodruff, James Raymond, PhD, Professor Emeritus of Agronomy and Soils
- Woods, Sam Gray, BS, Professor Emeritus of Animal Science, Edisto Experiment Station
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- Yang, Tah-Teh, PhD, Professor Emeritus of Mechanical Engineering
- Yardley, Darrell Gene, PhD, Professor Emeritus of Zoology
- Yates, William Pierce, MS, Extension Program Coordinator Emeritus
- Young, Arthur P., PhD, Campbell Endowed Chair and Professor Emeritus of English
- Zahner, Robert, PhD, Professor Emeritus of Forestry
- Zehr, Eldon Irvin, PhD, Professor Emeritus of Plant Pathology and Physiology
- Zielinski, Paul Bernard, PhD, Director Emeritus, Water Resource Research Institute; Professor Emeritus of Civil Engineering
- Zimmerman, James Kenneth, PhD, Professor Emeritus of Biochemistry

APPENDIX

ENGLISH FLUENCY

Clemson University has established a policy to assure that all instructional activities are conducted by individuals possessing appropriate proficiency in written and oral use of the English language. Instructional activities include lectures, recitation or discussion sessions, and laboratories. The individuals to be certified include full-time and part-time faculty, graduate teachers of record, graduate teaching assistants, and graduate laboratory assistants for whom English is not the first language.

A student who experiences difficulty with an instructor's written or oral English and who wishes to seek relief must do so prior to the seventh meeting of a 50-minute class and prior to the fifth meeting of a 90-minute class in regular semesters. In the five-week summer sessions, relief must be sought prior to the third class meeting.

The procedure is summarized as follows:

a. The student must quickly bring the problem to the attention of the instructor's department chair either directly or through a faculty member such as the student's advisor. That department chair will assess the complaint and, if deemed valid, offer an appropriate remedy within two days.

b. A student who is not satisfied with the department chair's decision or the relief suggested, may appeal within two days to a five-member hearing panel comprised of three faculty members and two students appointed by the Senior Vice Provost and Dean of Undergraduate Studies.

Students with questions should contact the Associate Dean of Undergraduate Studies, E-103 Martin Hall.

EQUAL OPPORTUNITY AFFIRMATIVE ACTION

Clemson University, in compliance with Titles VI and VII of the Civil Rights Act of 1964, as amended, Title IX of the Education Amendments of 1972, and Sections 503 and 504 of the Rehabilitation Act of 1973, does not discriminate on the basis of race, color, national origin, religion, sex, or disability in any of its policies, procedures, or practices; nor does the University, in compliance with the Age Discrimination in Employment Act of 1967, as amended, and Section 402 of the Vietnam Era Veterans Readjustment Act of 1974, discriminate against any employees or applicants for employment on the basis of their age or because they are disabled veterans or veterans of the Vietnam era. Clemson University conducts its programs and activities involving admission, access, treatment, employment, teaching, research, and public service in a nondiscriminatory manner as prescribed by Federal laws and regulations.

In conformance with University policy and pursuant to Executive Order 11246, as amended, Section 503 of the Rehabilitation Act of 1973, and Section 402 of the Vietnam Era Veterans Readjustment Act of 1974, Clemson University is an Affirmative Action/Equal Opportunity Employer.

Inquiries concerning the above may be addressed to the following:

Executive Secretary
Clemson University Board of Trustees
201 Sikes Hall
Clemson University
Clemson, SC 29634

Director, Office for Access and Equity
207 Holtzendorff
Clemson University
Clemson, SC 29634

Director, Office for Civil Rights
Department of Education
Washington, DC 20201

FAMILY PRIVACY PROTECTION ACT

The South Carolina Family Privacy Protection Act (SC Code 30-2-10 et. seq.) defines personal information as "...information that identifies or describes an individual including, but not limited to, an individual's photograph or digitized image, social security number, date of birth, driver's identification number, name, home address, home telephone number, medical or disability information, education level, financial status, bank account(s) number(s), account or identification number issued by and/or used by any federal or state governmental agency or private financial institution, employment history, height, weight, race, other physical details, signature, biometric identifiers, and any credit records or reports."

Some of the information in documents which students provide to Clemson University may be personal information as defined above. Pursuant to Section 30-2-40 B, students are advised that this information may be subject to public scrutiny or release. They are also advised that personally-identifiable information contained in these educational records falls under the federal Family Educational Rights and Privacy Act of 1974, as amended (FERPA). If students elect to opt out of the release of directory information under FERPA, the University will not release any personal information except as otherwise required or authorized by law.

Visit <http://www.clemson.edu/administration/ogc/policies/index.html> for additional information.

HARASSMENT

In general, harassment is unwelcome verbal or physical contact, based upon race, color, religion, sexual orientation, gender, national origin, age, disability, status as a military veteran, or protected activity (i.e., opposition to prohibited discrimination or participation in the statutory complaint process), that unreasonably interferes with the person's work or educational performance or creates an intimidating or hostile work or educational environment. Examples may include, but are not limited to, epithets, slurs, jokes, or other verbal, graphic, or physical contact.

The entire text of the University's policy on harassment can be obtained from the Office of Access and Equity, 207 Holtzendorff, (864) 656-3181 or at www.clemson.edu/access/policies.html.

INFORMATION RESOURCES FOR STUDENTS

Clemson University computing resources are the property of Clemson University, to be used for university-related business. Students have no expectation of privacy when utilizing university computing resources, even if the use is for personal purposes. The university reserves the right to inspect, without notice, the contents of computer files regardless of medium, the contents of electronic mailboxes and computer conferencing systems, systems output such as printouts, and to monitor network communication when

1. It is considered reasonably necessary to maintain or protect the integrity, security or functionality of university or other computer resources or to protect the university from liability;
2. There is reasonable cause to believe that the users have violated this policy or otherwise misused computing resources;
3. An account appears to be engaged in unusual or unusually excessive activity;
4. It is otherwise required or permitted by law.

Any suspected violations of this policy or any other misuse of computer resources by students normally should be referred to the Office of Student Conduct. That office will investigate the allegations and take appropriate disciplinary action. Violations of law related to misuse of computing resources may be referred to the appropriate law enforcement agency.

Notwithstanding the above, Clemson Computing and Information Technology may temporarily suspend, block or restrict access to an account, independent of university disciplinary procedures, when it appears reasonably necessary to do so in order to protect the integrity, security or functionality of university or other computer resources, to protect the university from liability, or where the emotional or physical well-being of any person is immediately threatened. When CCIT unilaterally takes such action, it will immediately notify the account holder of its actions and the reason for them in writing. The account holder may appeal the action taken by CCIT in writing to the Chief Information Officer.

Access will be restored to the account holder whenever the appropriate investigatory unit of the university determines that the protection of the integrity, security or functionality of university or other computing resources has been restored and the safety and well being of all individuals can reasonably be assured, unless access is to remain suspended as a result of formal disciplinary action imposed through the Office of Student Conduct or as a result of legal action.

Use of University computing resources, including network facilities, account numbers, data storage media, printers, plotters, microcomputer systems, and software for computing activities other than those authorized by the University is strictly prohibited. Unauthorized use of such resources is regarded as a criminal act in the nature of theft, and violators are subject to suspension, expulsion, and civil and criminal prosecution.

Use of university computing resources, including network facilities, account numbers, data storage media, printers, plotters, microcomputer systems, and software for computing activities other than those authorized by the university is strictly prohibited. Unauthorized use of such resources is regarded as a criminal act in the nature of theft and violators are subject to suspension, expulsion, and civil and criminal prosecution.

The following are examples of misuse of computing resources:

1. Unauthorized duplication, distribution or alteration of any licensed software. This includes software licensed by the university and licensed software accessed using the computing networks.
2. Attempting to gain unauthorized access to any computing resource or data, or attempting to disrupt the normal operation of any computing resource or network – at Clemson or anywhere on the Internet,
3. Attempting to use another student's or employee's computer account or data, without their permission.
4. Using the university electronic mail system to attack other computer systems, falsify the identity of the source of electronic mail messages. Sending harassing, obscene or other threatening electronic mail. Attempting to read, delete, copy or modify the electronic mail of others without their authorization. Sending, without official university authorization, "for-profit" messages, chain letters or other unsolicited "junk" mail.
5. Knowingly infecting any computing resource with a software virus.
6. Tampering with the university computer network or building wiring or installing any type of electronic equipment or software that could be used to capture or change information intended for someone else.
7. Participating in a "denial of service" attack on any other computer, whether on or off campus.
8. Using university computing or network resources for personal gain or illegal activities such as theft, fraud, copyright infringement, piracy (e.g., sound or video recording), or distribution of child pornography or obscenities.

PATENTS AND COPYRIGHTS

All students enrolling in Clemson University do so with the full understanding that students working on sponsored projects and/or who use Clemson University resources other than for lecture-based coursework or other course-related assignments are subject to the Clemson University Intellectual Property Policy.

1) In accordance with the University Intellectual Property Policy, student Creators' do not hold rights to intellectual property created developed, or generated:

- i. In the course of rendering compensated services to the University; or
- ii. As part of sponsored research projects; or

iii. Pursuant to an agreement that requires the University and/or student to assign his or her rights either to the University or to a third party; or

iv. Using pre-existing or background intellectual property belonging to the University or a third party with whom the University has a contract under which such background intellectual property rights are already allocated.

v. Notes:

1. Student retains a non-exclusive, royalty-free, perpetual, irrevocable license to use, reproduce, and publicly distribute, for educational and/or research purposes, copies of intellectual property created by student.

2. If intellectual property is developed or generated as a group class project, joint ownership by the collaborators will be assumed unless a prior written agreement exists among the collaborators.

*A Creator is defined as an author of, inventor of, or person who discovers, develops, or generates any type of intellectual property. Inventorship and authorship shall be determined in accordance with patent law and copyright law, respectively.

Section 5.c of the University Intellectual Property Policy, November 23, 2009

2) All Creators have a duty to promptly disclose intellectual property authored, invented, created, discovered, developed, or generated by Creator(s) to the Clemson University Intellectual Property Committee (IPC). See *Appendix III, University Intellectual Property Policy, November 23, 2009*.

3) Except as set forth in other related University policies, this applies to all types of intellectual property, including, but not limited to, any invention, discovery, creation, know-how, trade secret, technology, scientific or technological development, mask work, trademark, research data, work of authorship, and computer software regardless of whether subject to protection under patent, trademark, copyright, or other laws.

The University Intellectual Property policy is available online at www.clemson.edu/research/technology/policies. Questions regarding this policy should be directed to the Office of Technology Transfer at (864) 656-4237.

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